

Treatment Of Garment Dyeing Wastewater By Coagulation And Flocculation Process Using Mucilage Extracted From *Hylocereus undatus*

Pham Lan Huong, Tran Nhat Le, Ngo Van Anh, Le Thi Hoang Oanh
VNU University of Science – Faculty of Environmental Sciences

Introduction

The garment dyeing waste-water ranks first in the release of dyes and chemicals, which contains a high content of **suspended solids** causing heavy environmental pollution. Thus, the **coagulation - flocculation process** is utilized as a pre-treatment process with the use of chemical agents. However, the residual metallic elements have many disadvantages such as high cost and affecting to human health.

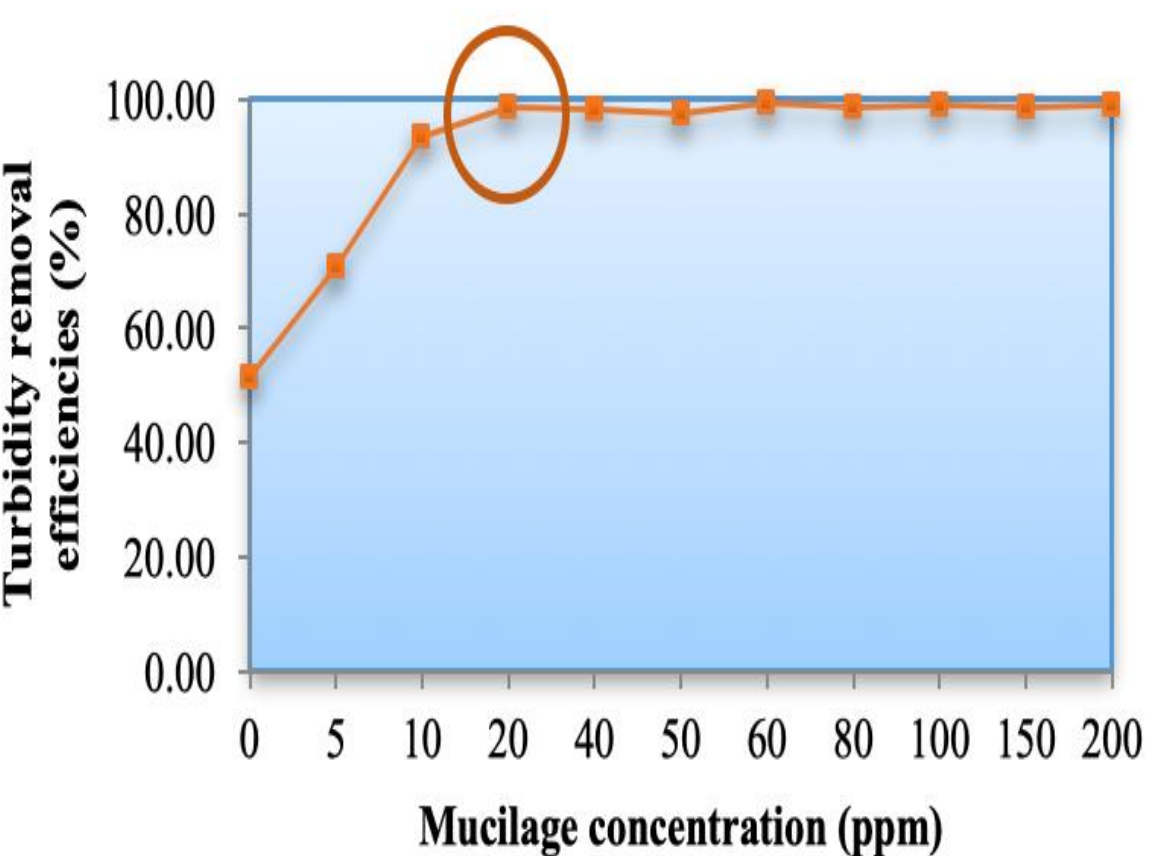
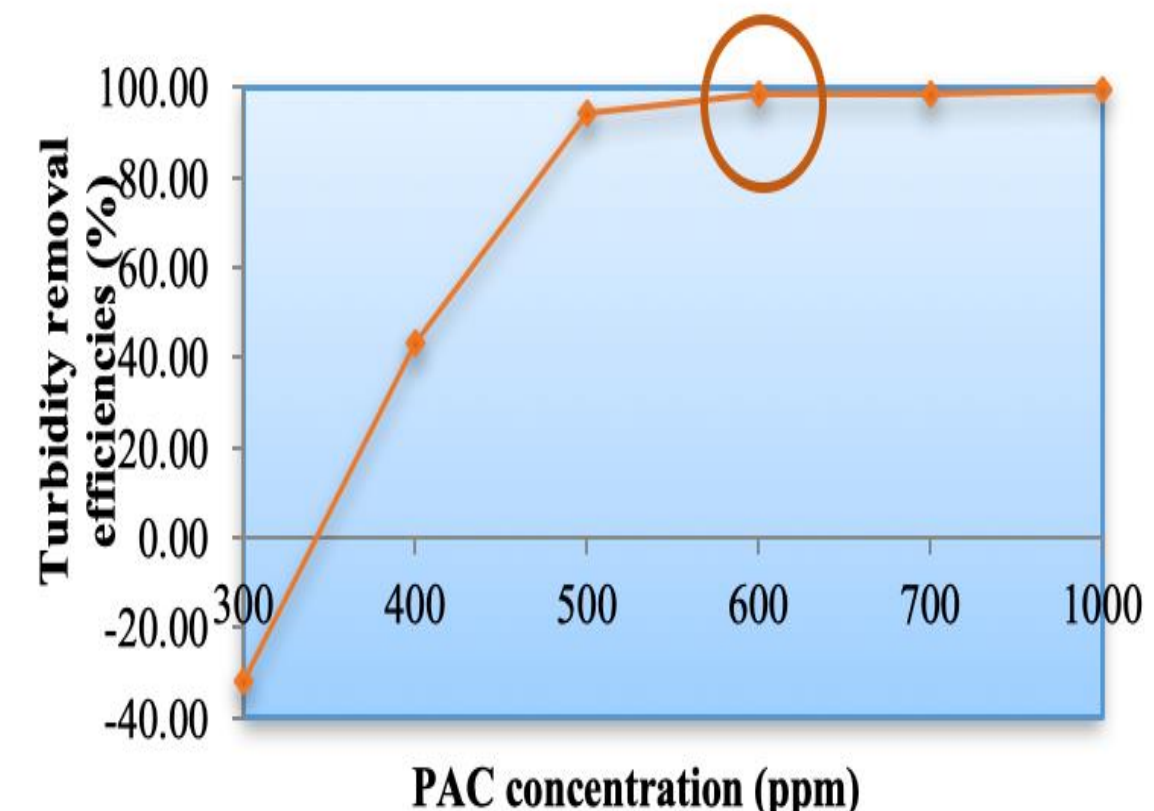
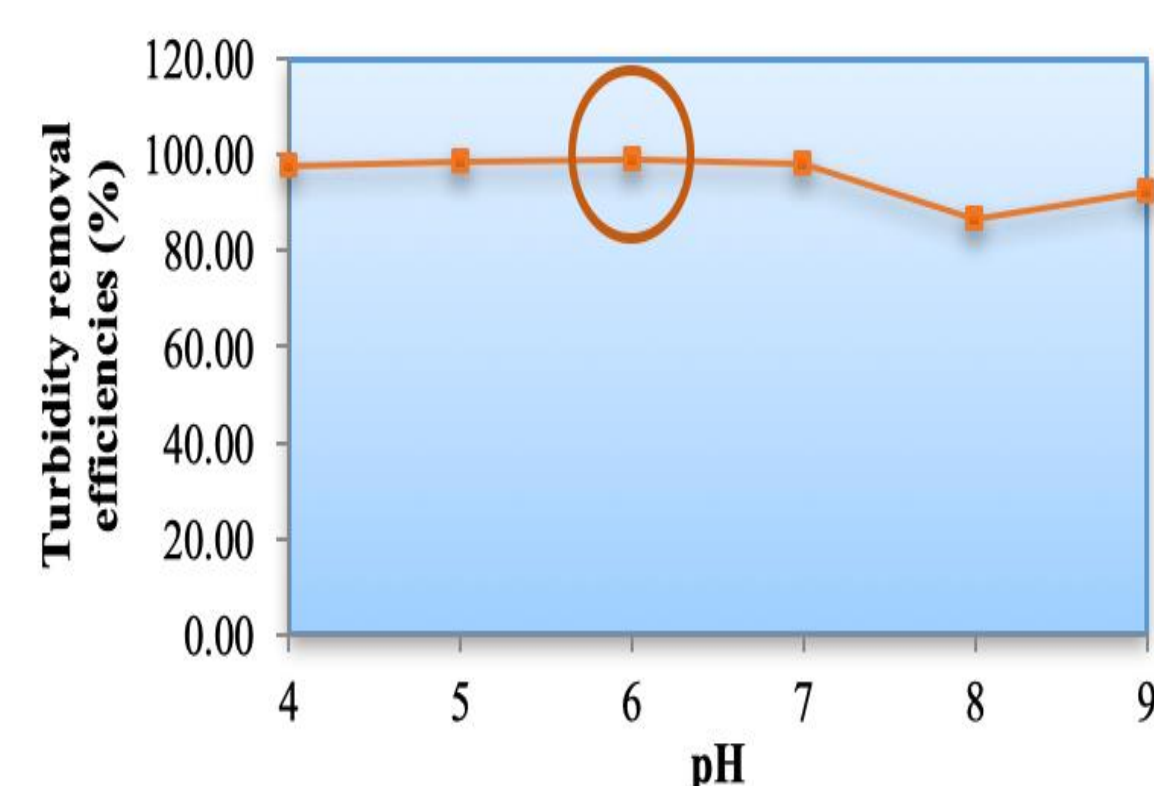
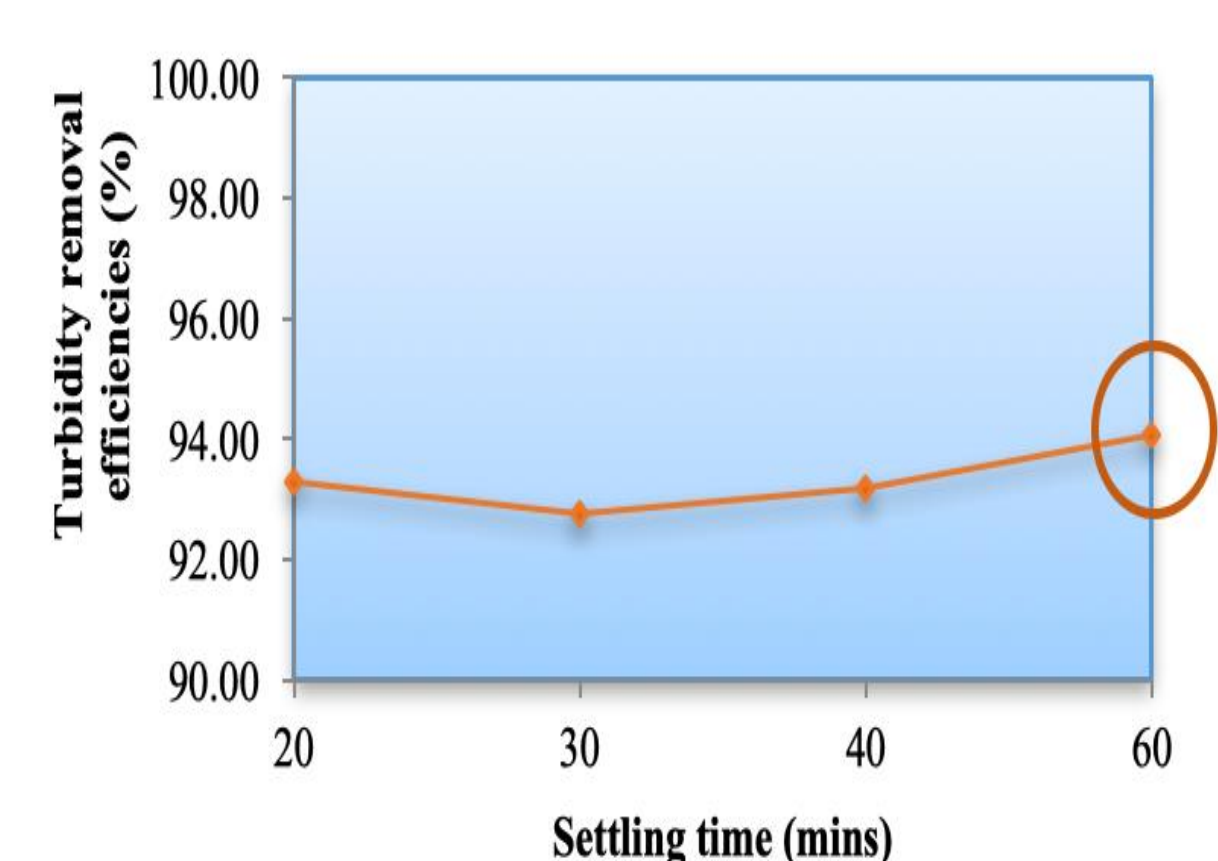
- ➔ Production of mucilage from *Hylocereus undatus*
- ➔ Determination of **turbidity removal efficiencies** of the mucilage combined with PAC in garment dyeing wastewater containing dispersed and mixed dye effluents from Duong Noi, Hanoi.

Materials and Method

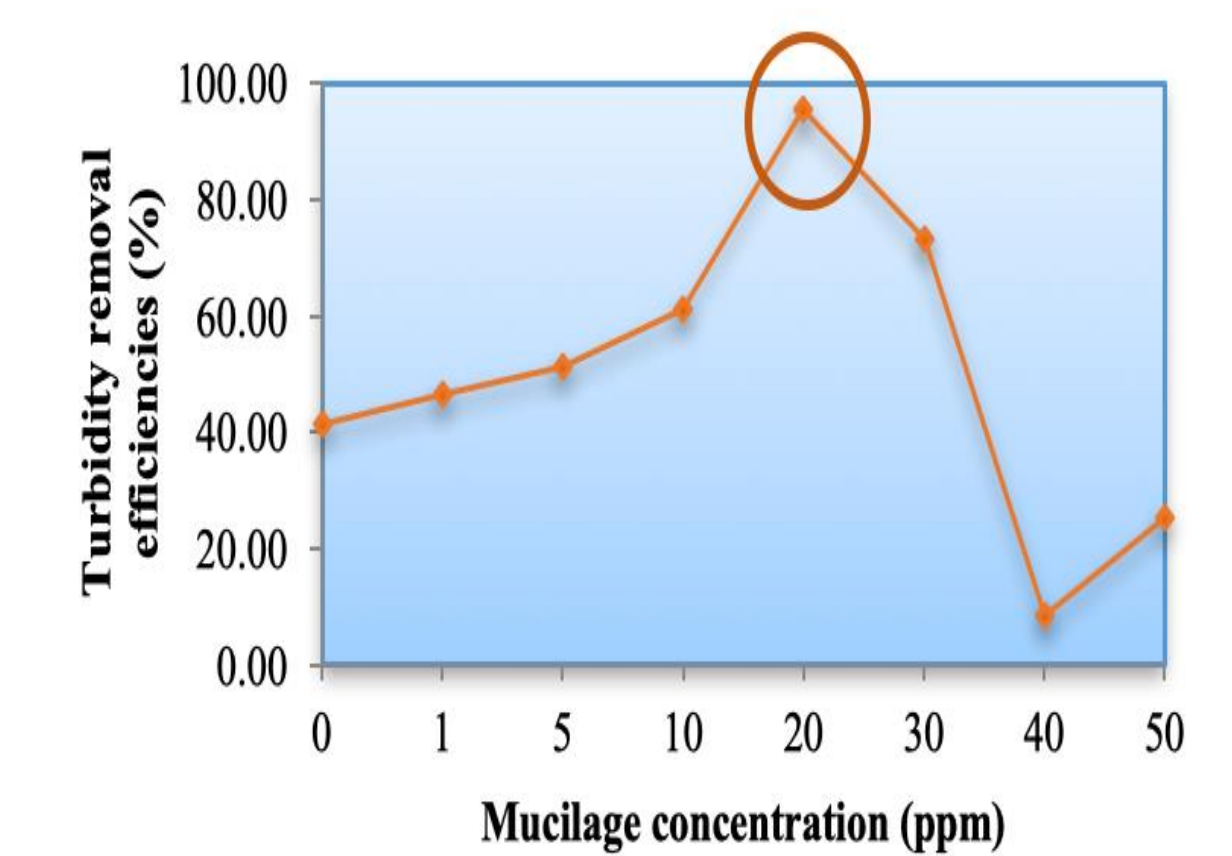
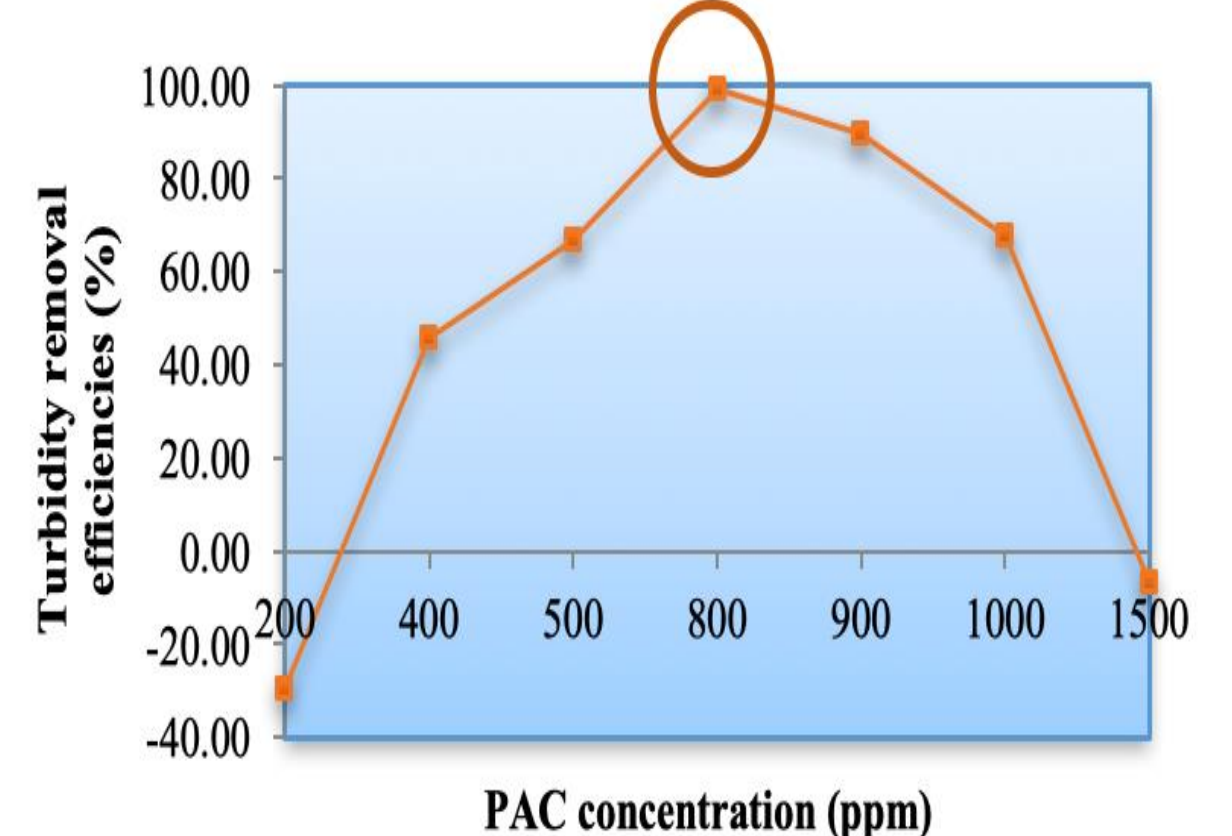
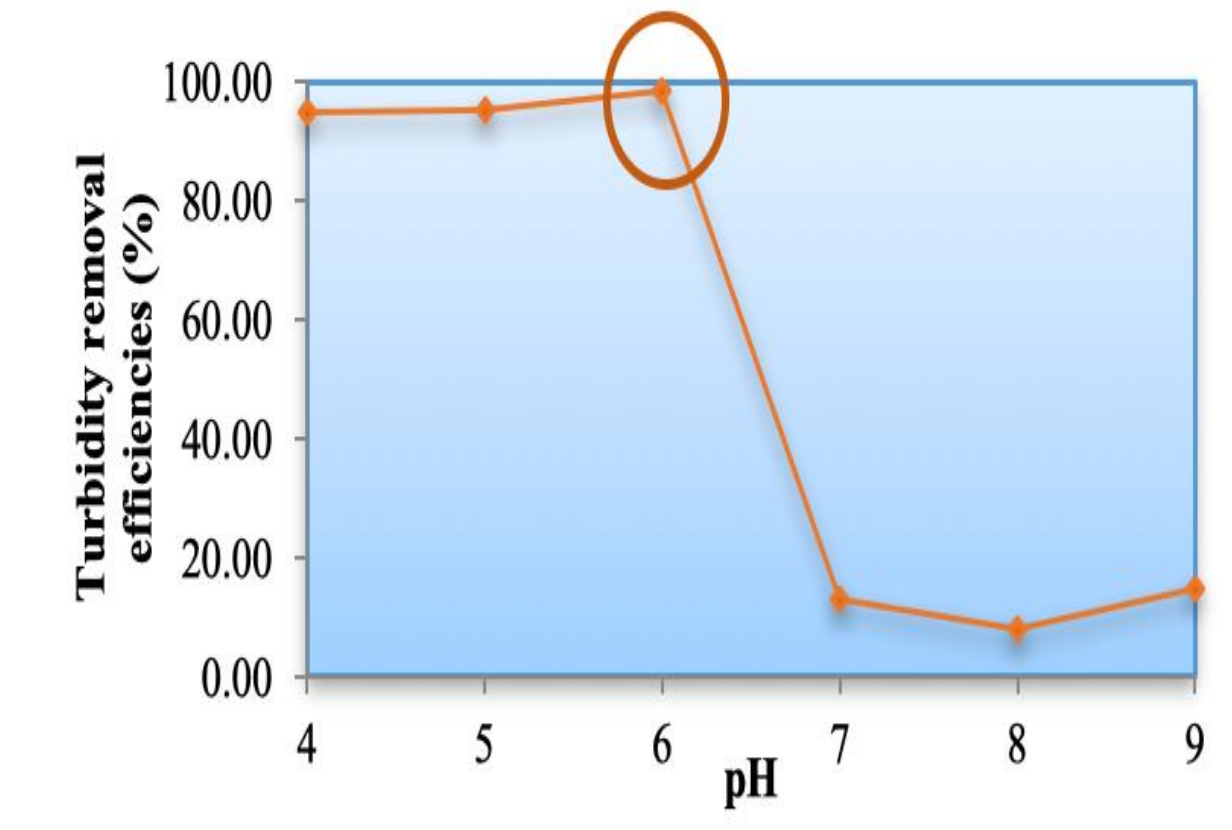
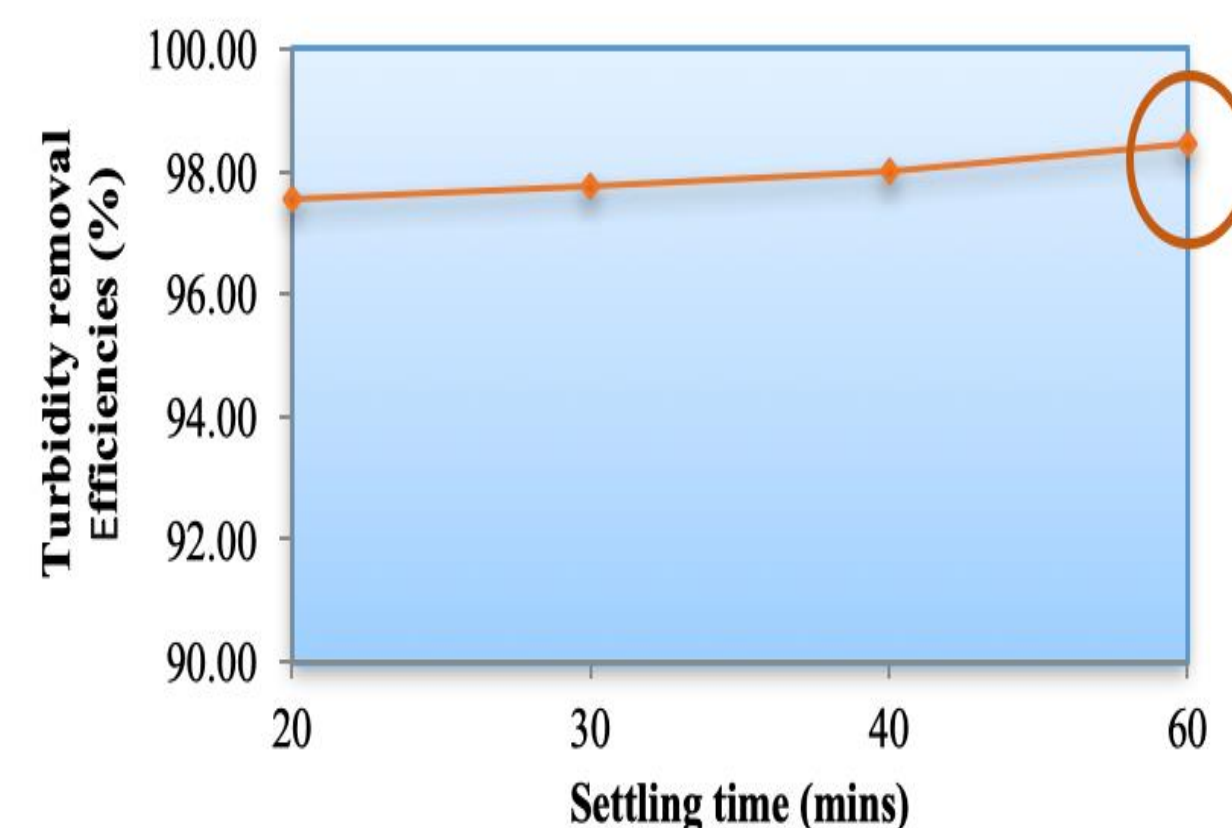
Hylocereus undatus was obtained from local market of Hanoi. Collected peels were carefully washed and dried at 50-55°C for 24h. The dried parts' size was reduced through grinder. The small pieces were kept in different volumes of distilled water and heated in the water bath for 1 hour. The concentrated solution has filtrated through 8-folded muslin cloth in water separately. The acetone was added to the filtrate in order to precipitate the mucilage. The floating precipitation was taken then further dried to constant weight at 45°C in desiccators before it was grinded and sieved for further used. The mucilage powder was dissolved in distilled water to be used as flocculant in the experiments based on Jarrests.

Results and Discussion

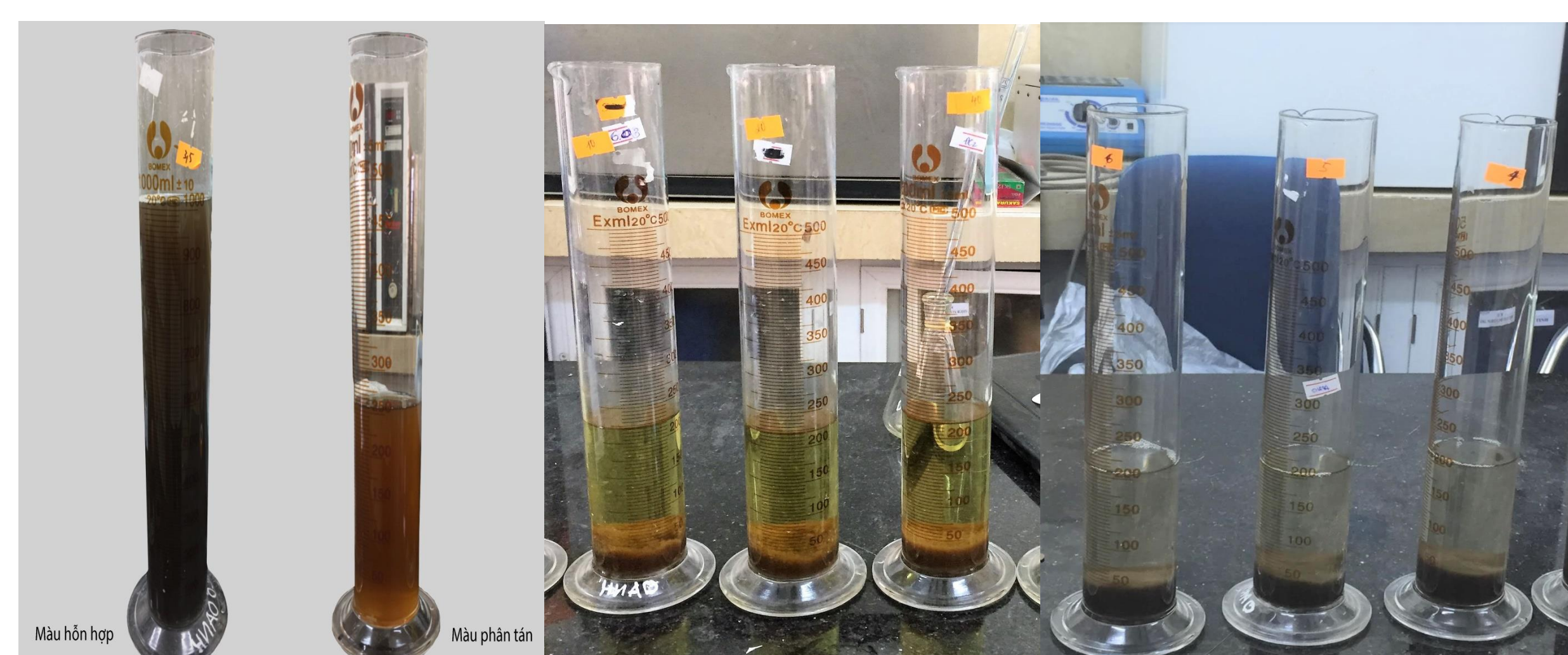
Dispersed dyeing effluent



Mixed dyeing effluent



Mucilage extraction from *Hylocereus undatus* with the yeild 10,96% w/w



Mixed and dispersed dyeing wastewater before treatment

Dispersed wastewater after treatment

Mixed wastewater after treatment

Conclusions

- For dispersed and mixed dye wastewaters, the mucilage extracted from *Hylocereus undatus* can remove **96.8%** and **95.6%** turbidity when used in conjunction with less amount of PAC (up to 25%), corresponding to about 50% increase of removal efficiency.
- Reduction chemicals used and the risk of chemical residues on human health.

Contact

Pham Lan Huong - Tran Nhat Le
Faculty of Environmental Sciences
VNU University of Science
trannhatle_t61@hus.edu.vn

References

1. J. Tomperi, M. Pelo, K. Leiviska, *Predicting the residual aluminum level in water treatment process*, University of Oulu, Finland.
2. K. Anastakis, Dimitrios Kalderis, Evan Diamadopoulos, *Flocculation behavior of mallow and okra mucilage in treating wastewater*, Department of Environmental Engineering, Technical University of Crete, Chania 73100, Greece.
3. Md. Som, Ayub & Fatah Abd Wahab, Abdull. (2018). *Performance Study of Dragon Fruit Foliage as a Plant-based Coagulant for Treatment of Palm Oil Mill Effluent from Three-phase Decanters*. Bioresources. 13.
4. García-Montalvo, Iván & Cervantes, Carlos. (2017). *Vegetable coagulants as alternative for treatment of wastewater in Mexico*. Journal of negative & no positive results. 2. 687-694.
5. Ahmad Ridhwan Bin Mohd Yunus (2017). *Optimization on Preparation Condition of Hylocereus Foliage Coagulant Using Response Surface Methodology*. Research Proposal, School of Chemical Engineering, USM.