Characterization of Bioflocculant Produced by *Streptomyces* sp. Ap4

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Introduction

• Flocculation refers to the process by which destabilized particles conglomerate into larger aggregates so that they can be separated from the wastewater (Droste, 1997).

• In general, flocculants are classified into three groups: inorganic flocculants, such as aluminum sulfate and polyaluminum chloride; organic synthetic flocculants, such as polyacrylamide derivatives and polyethylene amine; and naturally occurring flocculants (Lee et al., 2014)
A bioflocculant on the other hand, is a kind of biodegradable polymeric flocculants produced by many microorganisms during their growth (Gao et al., 2006; Defang et al., 2008; Mabinya et al., 2012)

Compared with conventional synthetic organic flocculants, bioflocculant have special advantages such as safety for ecosystems, potential flocculating effects, biodegradability and harmlessness to humans and the environment, and as a consequence may potentially be applied in drinking and wastewater treatment, downstream processing, food, pharmaceutical and fermentation processing (Salehizadeh and Shojaosadati, 2001; Ntsaluba et al., 2013; Ozcan and Oner, 2015)
Methodology

• Culture Preparation
• 16SrDNA Sequence Determination and Phylogenetic Analysis of the Bioflocculant-Producing A. aquatilis AP4
• Bioflocculant Production by A. aquatilis AP4
• Determination of Flocculating Activity
• Effects of Carbon Source on Bioflocculant Production by A. aquatilis AP4
• Effects of pH, Incubation Temperature and Static/Agitation on Bioflocculant Production by A. aquatilis AP4
• Characterization of the Bioflocculant Produced by A. aquatilis AP4
• Statistical Analysis
Results and Discussions

Fig. 1. Molecular Phylogenetic analysis by Maximum Likelihood method of the isolate.
Fig. 2. Effect of different carbon source (wastewater) on bioflocculant production by A. aquatilis AP4

Fig. 3. Effect of pH on bioflocculant production by A. aquatilis AP4
Fig. 4. Effect of incubation temperature on bioflocculant production by A. aquatilis AP4

Fig. 5. Effect of static/agitation on bioflocculant production by A. aquatilis AP4
Fig. 6. Effect of speed (rpm) on bioflocculant production

Fig. 7. FT-IR spectroscopy performed on purified bioflocculant produced by the isolate
Conclusion

• In conclusion, cultural conditions such as carbon source, pH, incubation temperature and agitation have significant effect on the bioflocculant production.

• Glucose, 30°C, pH 9.0, agitation and shaking speed of 140 rpm were the best for maximum production of bioflocculant by the isolate.

• The bioflocculant is a glycoprotein consisting of hydroxyl, amide and carboxyl as its functional groups.

• Isolate AP4 is a good agent with high flocculating activity (89.58%), it therefore has the potential to be used on a large scale for bioflocculant production, which could serve as a possible substitute for non-biodegradable, carcinogenic and harmful chemical flocculants which is often used in the treatment of water today.

• Further studies on the biotechnological application of the bioflocculant and the genes responsible for flocculation are in progress.
Selected References

- Ntsaluba L, Nwodo UU, Mabinya LV, Okoh AI. Studies on bioflocculant production by a mixed culture of ethylobacterium sp.