

## Author's Accepted Manuscript

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PII: S2352-7102(16)30356-4  
DOI: <https://doi.org/10.1016/j.jobee.2018.01.002>  
Reference: JOBE390

To appear in: *Journal of Building Engineering*

Received date: 10 December 2016  
Revised date: 19 August 2017  
Accepted date: 2 January 2018

Cite this article as: G.D.O. Okwadha and D.M. Makomele, Evaluation of water hyacinth extract as an admixture in concrete production, *Journal of Building Engineering*, <https://doi.org/10.1016/j.jobee.2018.01.002>

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## Evaluation of water hyacinth extract as an admixture in concrete production

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### Abstract

Chemical and mineral admixtures commonly used in the production of self-compacting concrete (SCC) are too expensive and pollute the environment. This study evaluated the effectiveness of using a bio-admixture as partial replacement for Auramix 400 chemical superplasticizer in SCC production. Water hyacinth extract was used for this purpose. Gas Chromatography-Mass Spectrometer analysis revealed concentrations of lingo cellulose, saturated and unsaturated fatty acids which make this admixture a retarder. Water hyacinth extract was added at 0, 10, 15, 20 and 25% replacement of Auramix 400, and the mechanical properties of the concrete were determined. The workability as measured by the slump flow test and  $T_{500}$  were within the recommended values of 500-700 mm and 2-5 seconds respectively, an indication that the water hyacinth extract can be used as a superplasticizer in a SCC mix. There was an increase in  $T_{500}$  and setting time as superplasticizer replacement was increased. This result indicated that the water hyacinth extract retards the hydration rate and hardening process making the concrete to flow longer hence high flowability and filing ability. The compressive strength increased as the superplasticizer replacement was increased irrespective of the curing period. In addition, water permeability increased with an increase in the amount of water hyacinth extract. The optimum superplasticizer replacement was found to be 20%.

**Keywords:** Water hyacinth; SCC; Admixture; Superplasticizer; Compressive Strength; Permeability.

### 1.0 Introduction

Many important characteristics of concrete are influenced by the ratio (by weight) of water to cementitious materials used in the mixture. By reducing the amount of water, the cement paste will have higher density which results in higher paste quality. An increase in paste quality will produce a concrete with higher compressive and flexural strength, lower permeability, increased resistance

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