

# Eco-friendly flocculant prepared from date palm rachis

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## Objective

Sodium Carboxymethylcellulose (CMCNa) is an anionic water soluble polyelectrolyte widely used in many industrial sectors including food, textile, paper, adhesives, paints, pharmaceuticals, cosmetics and mineral processing. It is produced by chemical modification of cellulose, a natural renewable non toxic and biodegradable organic polymer.

**In this study, different CMCNa prepared from date palm rachis were tested and flocculation performances were assessed.**

The first set of experiments was devoted to the determination of the suitable conditions for coagulation-flocculation i.e.: pH = 8, concentration of the flocculants = 100mg/L and stirring velocity (during the flocculation step) = 30rpm. For these conditions, the turbidity removal using CMCNa prepared from date palm rachis (QR2) was about 95%. A comparative study involving a commercial flocculation agent showed that maximum percent turbidity abatement was 20% higher with the CMCNa obtained in our work.

## Current work

### Preparation of sodium carboxymethylcelluloses from date palm rachis and their valorization as flocculating agents to treat waste water

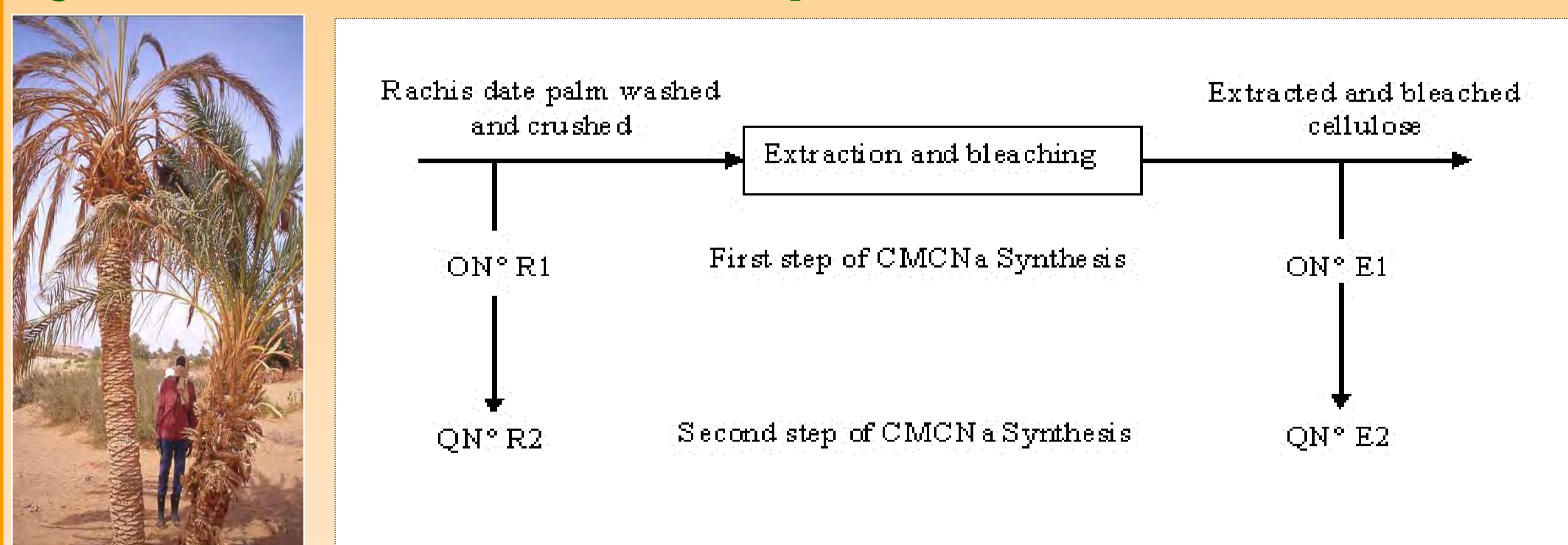


### Carboxymethylcellulose (CMC) ?

CMC was synthesized for the first time in 1920 and is the most used cellulose derivative. It is an anionic water soluble polyelectrolyte.

## Material & Methods

### Synthesis of CMC from date palm rachis



### Characterization of CMC from date palm rachis

	Extracted and bleached Cellulose	QR1	QE1	QR2	QE2
DP	1467	1040	400	480	240
DS	0	0.98	1.25	1.17	1.86

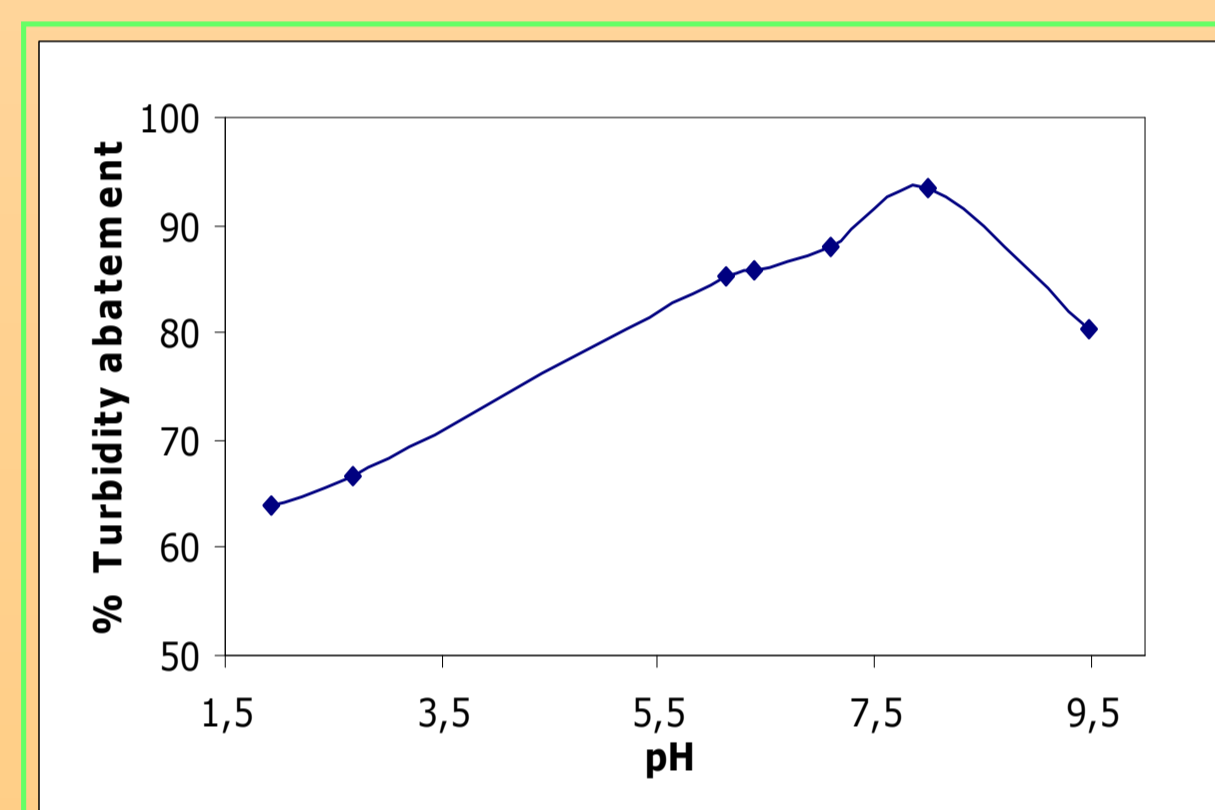
### Water characteristics

The water used in this work was natural surface water charged with suspended particles (TSS). Its physicochemical characteristics were: pH (6), TSS (345 ppm), conductivity (2150  $\mu$ S/cm) and turbidity (33 NTU).

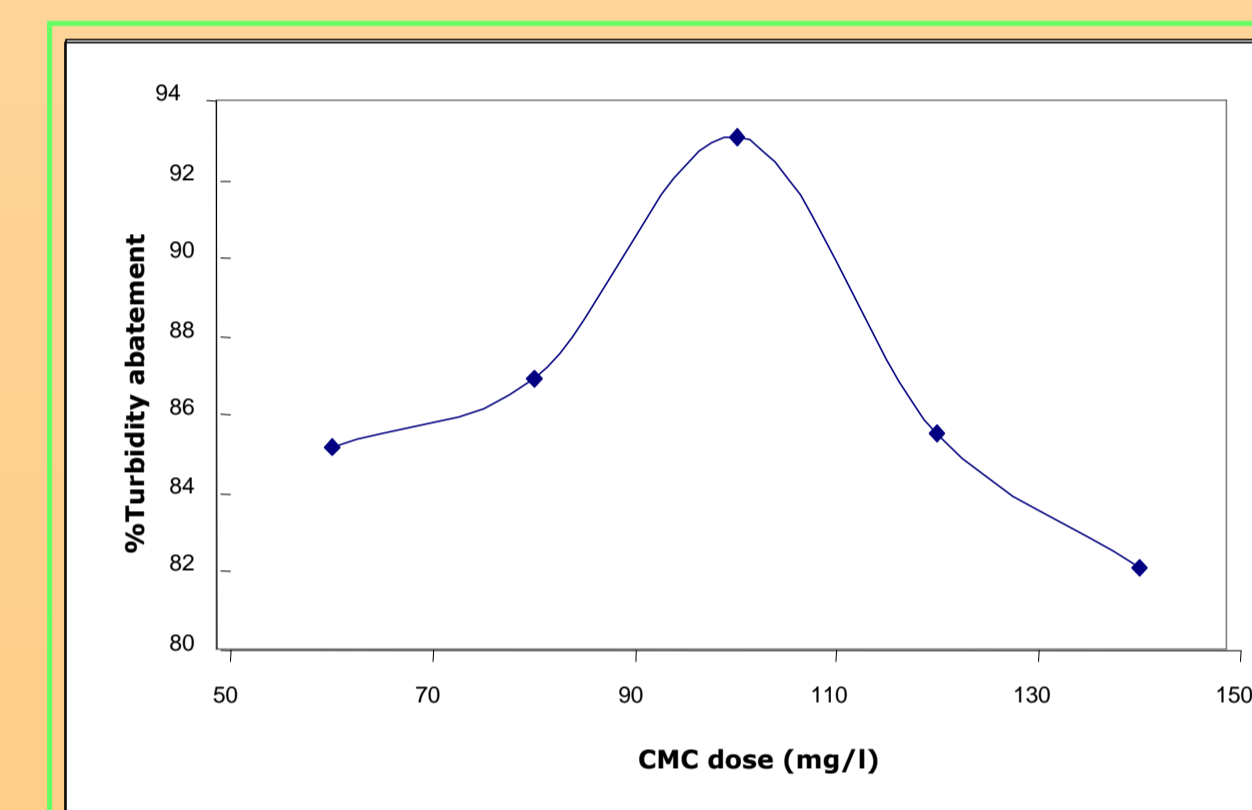


## Results & Discussion

### Effects of pH and flocculant dose on coagulation-flocculation process

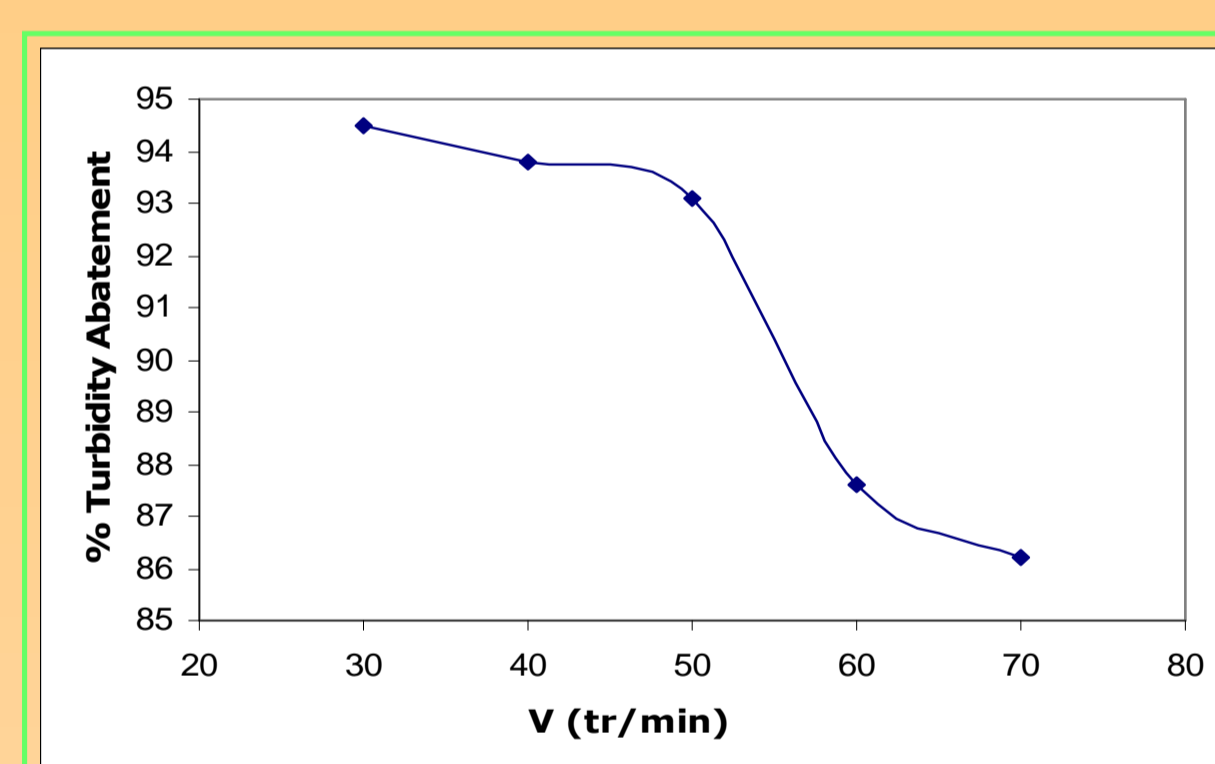


The optimum pH for coagulation-flocculation was obtained for basic medium, particularly around 8.

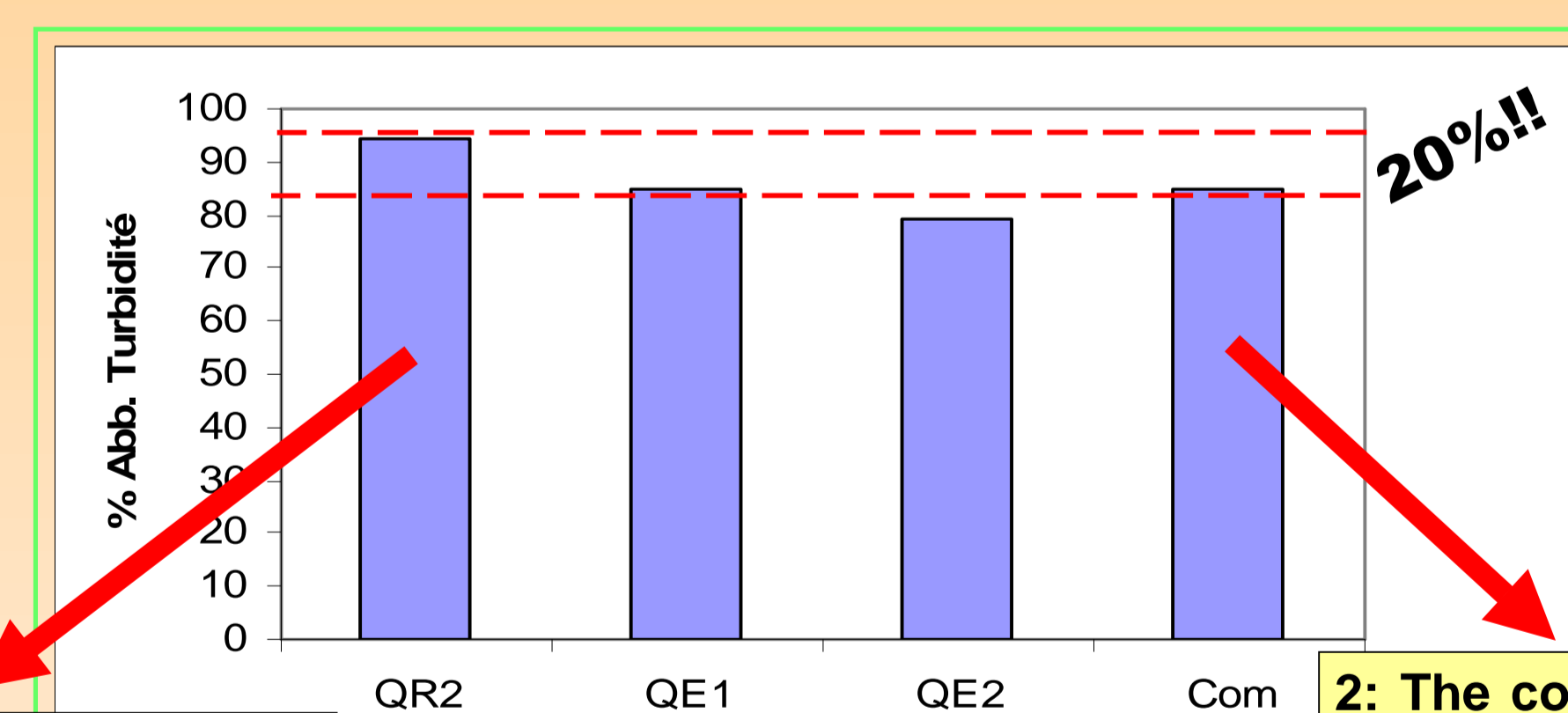
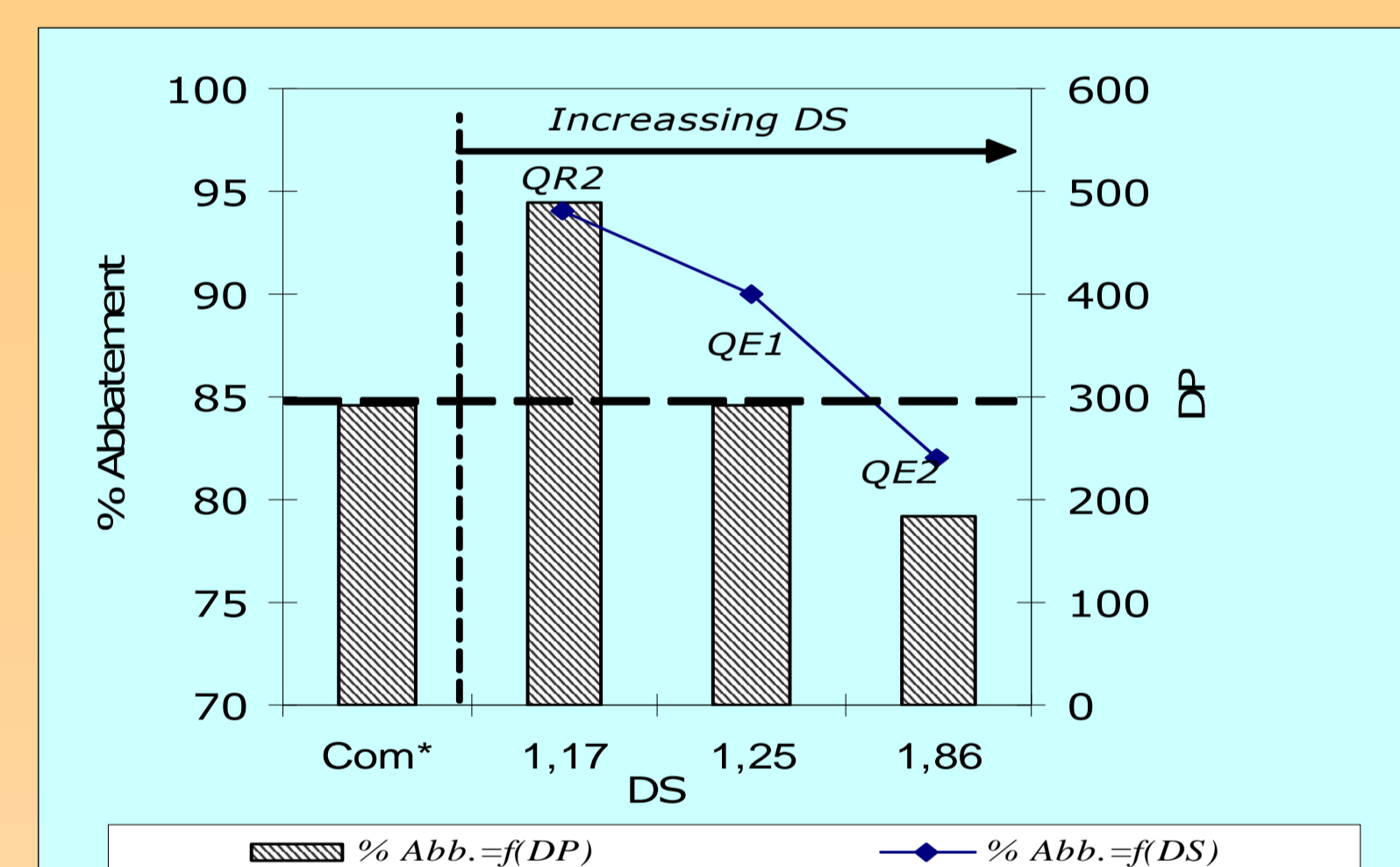


The most effective dose of the flocculating agent was found to be 100 mg per liter of water to be treated.

### Effect of the flocculation mixing speed and CMC qualities on flocculation performance

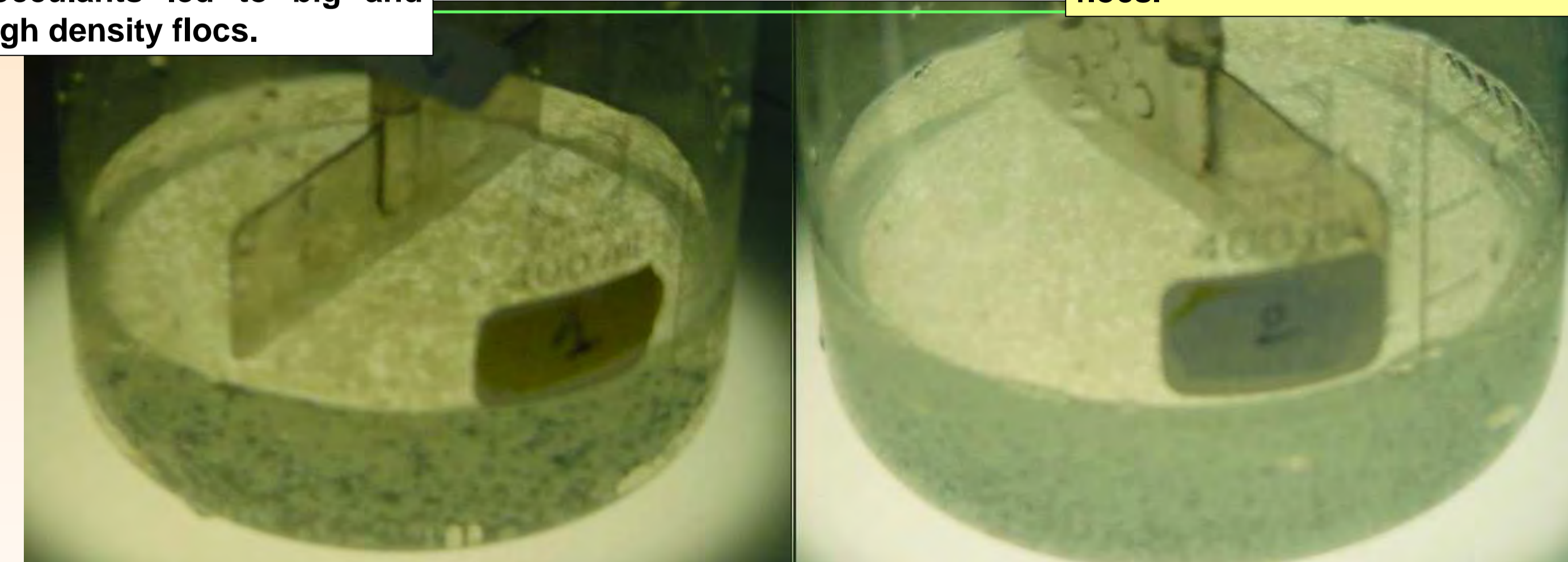


The maximum turbidity removal was observed for the slowest speed of mixing (30 rpm).



1: Rachis date palm-based flocculants led to big and high density flocs.

2: The commercial polyelectrolyte yielded small and low density flocs.



## Conclusion & Perspectives

This study demonstrates that an eco-friendly flocculating agent prepared from an agricultural waste (date palms rachis) can be used to improve water quality in terms of turbidity. The percent turbidity abatement, in the case of QR2, was 20% higher than that of the commercial counterpart (A100 PWG), used as a reference.