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# CHEMICAL CHARACTERIZATION OF SARGASSUM (*SARGASSUM SPP*) PRESENT ON THE COASTS OF MAHAHUAL AND ITS POSSIBLE USE AS FERTILIZER

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**Abstract:** Sargassum began arriving on the coasts of Quintana Roo since the end of 2014, intensifying in 2015; In 2018 the volume was exaggerated, its arrival continued until September 2019, and then it declined. By 2018 and 2019, the volume and extent of this sargassum in the Atlantic had already become alarming; it was estimated that in June 2018 its live weight in the sea was more than 20 million tons, distributed over an area of more than 8,850 km1. Thus, the economic and social impact throughout the Caribbean region is extremely serious. In particular it represents an overwhelming problem for tourism. This activity is a source of income of primary importance for 35 countries, states and territories of the Greater Caribbean. For June Sooner, Secretary General of the Association of Caribbean States, this is a "natural disaster", a challenge and perhaps also an opportunity to develop a new truly sustainable tourism model for the region.
**Keywords:** Sargassum, Caribbean Sea.

## INTRODUCTION

It is important to know the chemical composition to know if it contains toxic elements that could limit its use in any field of application or if it has properties that could be useful. For this reason, the chemical components of sargassum were analyzed, identifying its species on the coasts of Xcalak and Mahahual (Figure 1) and the effects as solid and liquid fertilizer on *Phaseolus vulgaris* (common bean) were evaluated.

Figure 1: Population of Mahahual, image copied from:mahahual - Bing images

## METHODOLOGY

Sampling was designed along the coast of the community of Mahahual, developing three points (figure 2), along the coast impacted by Sargassum (*Sargassum spp*).

Determinations of the organic chemical compounds were carried out by Chromatographic Analysis, with a Hewlett Packard HP 5890 brand chromatograph, as well as the determination of the inorganic chemical compounds of some heavy metals, with a Varian spectrophotometer, model SpectrA 220, and the comparison of the effect of fertilizers (*Sargassum spp*) obtained by carrying out different applications on common bean (*Phaseolus vulgaris*) during germination and growth.

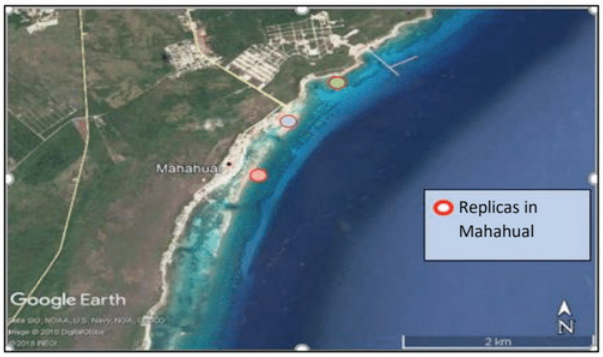


Figure 2: Sampling points in the Mahahual area, image taken from Google Earth.

## RESULTS AND DISCUSSIONS

The organic chemical components were determined, carrying out an ethanolic extraction and resulting in Phenols, Fatty Acids and Hydrocarbons.

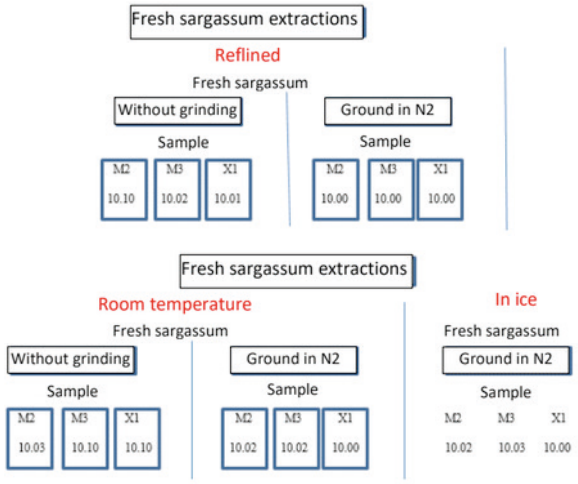


Figure 3: Results of the extraction of fresh fertilizer (*Sargassum spp*).

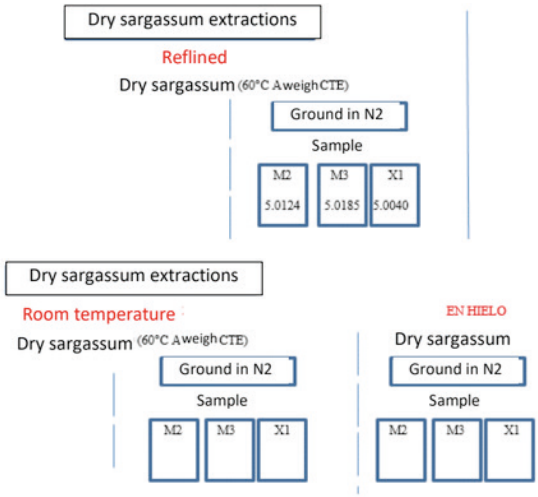


Figure 4: Results of extraction of dry fertilizer (*Sargassum spp*).

The determination of the heavy metals As, Cd and Zn were carried out by doing a Digestion with the ISO 114663 standard.

Which used 3 g of dry sample, distilled H2O, 7 ml HNO3 and 21 ml HCl.

## ORGANIC COMPOSITION

| TR signal | Relative identity | Content (µg/g) | T.S. | TI |
|---|---|---|---|---|
| **19.2** | Palmitico (C16:0) | 4.68 | 199.67 | 586.07 |
| **21.5** | Palmitoleic (C16:1 Δ9) | 73.52 | | |
| **21.8** | Stearic (C18:0) | 194.99 | | |
| **22** | Oleic (C18:1 Δ9) | 512.55 | | |

Table 1: Results of the organic components in Sargassum.

## HEAVY METALS

| | Ace | CD | Zn |
|---|---|---|---|
| Average concentrations obtained throughout the study. (ug/g) | 0.89 | 0.37 | 38.66 |

Table 2: Results of heavy metals in Sargassum.

## USE AS FERTILIZER

| Factor | L1 | L2 | S.S |
|---|---|---|---|
| **White** | 33.3 | 90 | 76.6 |
| **10** | 20 | 90 | 63.3 |
| **20** | 46.6 | 93.3 | 43.3 |
| **40** | 36.6 | 93.3 | 40 |
| **60** | 43.3 | 93.3 | 93.3 |
| **80** | 13.3 | 93.3 | 80 |
| **100** | 36.6 | 76.6 | 73.3 |

Table 3: Percentage of germination 25 days after applying the treatments

Robles de Benito[4], relates germination to the maximum germination time and comments that germination increases in different seaweeds and at different concentrations.

Sergio Sarmiento, publishes after positively evaluating the multiple efforts of local businessmen to respond to the problem: stopping sargassum before it arrives, use as compost, manufacturing adobe, considers that the scientific community "must focus on finding solutions for the generation itself of sargassum. In the environmental field, as in medicine, the best solution is prevention"[5]

## CONCLUSIONS

The species were identified: *Sargassum fluitans and Sargassum nathans*

Its organic chemical composition was; fatty acids.

Heavy metals: Arsenic (As) in the vast majority and Cadmium (Cd) and Zinc (Zn) in lower concentrations.

The type of application contributes to the germination and growth of the seedling, so we can use it as a fertilizer in different species of vegetative plants.

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