Platanus acerifolia is widely planted in major cities since it is a tough, durable tree that can tolerate severe pruning and smog. The plant typically grows up to 25 m and has a good shading capacity for dense leaf. This species is frequently found in many neighborhoods around the city of Buenos Aires. Hence, this work aims at examining and optimizing conditions to attain delignification of the leaf waste arising from the street sweeping of this species. For this purpose, the low-temperature acid-oxidative hydrolysis of the LCW is accomplished by digestion in a solution of glacial acetic acid and 30% hydrogen peroxide 1:1 (v/v) ratio, which was suggested as the best proportion for delignification [27].

2. Materials and Methods

2.1. Raw material pretreatment and characterization

The leaf waste was obtained from the leaves sweeping a street in the Saavedra neighborhood within Buenos Aires, where all the planted trees were *Platanus acerifolia*. The material (6kg) was separated from dust in an industrial sieve, mainly retaining dry leaves and stems. Then, the LCW was humidified, added to the same water mass, and triturated in batches of 1kg using a 2200W Turbo blender at 35000 rpm for 10 minutes. The resulting LCW was homogenized and kept in a freezer for subsequent characterization and a series of experiments. Analytical grade hydrogen peroxide, acetic acid, and sulphuric acid were used for the experiments.

The moisture of the samples was determined using a Precisa XM50 moisture analyzer (Precisa Gravimetrics AG, Dietikon, Switzerland). Standard methods determined the ash content and ethanol extractives. Lignin acid-insoluble contents of the untreated and treated samples were determined by dissolving 0.3 g of the specific substrate with 4mL of 72% v/v sulphuric acid and let to react 3 hours at room temperature (28ºC). Then, the solution was diluted to 5% v/v (1M) with distilled water and heated to 100ºC for 2.5 hours. The suspension was filtrated, dried, and weighted. The lignin content is obtained as the final dry mass referred to the initial solid dry mass. The cellulose content of the untreated sample was determined by dissolving 0.3 g of the substrate into 4mL of 72% v/v sulphuric acid. Immediately afterward, the solution was diluted to 5% v/v (1M) with distilled water, and the hydrolysis proceeded by heating to 100ºC for 2.5 hours. The suspension was filtrated, dried, and weighted. The cellulose content was determined as the difference between final and initial dry masses [33,34].

The oxidative hydrolysis was carried out in batch mode in 100mL Erlenmeyer, with orbital shaking. A solution (20 mL) containing equivalent volumes of glacial acetic acid and 30% hydrogen peroxide was contacted with different masses of LCW (5 to 15 g). The orbital shaker allowed regulating temperature and time. The temperature was modified within the 60-90°C range, while digestion was varied between 30 and 90 minutes. For reference, one sample was treated with a dilute solution of sulfuric acid (0.1M) under the conditions (90min, 90°C, 5g) that were found as optimal for biomass pretreatment aimed at subsequent enzymatic saccharification for bioethanol production [35]. The treated samples were filtered from the acid-oxidant liquor with a cheesecloth. Moisture and lignin content of the obtained solid samples were determined to get the solid fraction yield and lignin removal efficiency, as expressed in Eqs. 1 and 2, were m_0^{dry} and m_f^{dry} are the initial and final mass of solid samples on a dry and ash-free basis, and $\%Lignin$ indicates the fraction of insoluble lignin in the dry and ash-free basis.

$$\text{Solid fraction yield} = \frac{m_f^{dry}}{m_0^{dry}} \quad (1)$$

$$\text{Lignin removal} = \frac{\%Lignin_0 m_0^{dry} - \%Lignin_f m_f^{dry}}{\%Lignin_0 m_0^{dry}} \quad (2)$$