

# AN INNOVATIVE METHOD FOR A FASTER REMUAGE OPERATION



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## Rationale

Nowadays, in modern wineries, the remuage process is carried out using automated riddling machines. These machines are a partial solution to the problem of the labour costs incurred for moving the bottles; however, they require a high initial investment, while the remuage process will last about 7 days. A winery using these methods might not be able to meet a suddenly increasing demand for bottles, due to long waiting times. Therefore, it is desirable to reduce the duration of the remuage phase.

## Aim & scope

A research carried out by the Department of Agricultural and Environmental Sciences - Production, Landscape, Agroenergy of the Università degli Studi di Milano aims at **providing an innovative remuage method which is alternative to available solutions. The study proposes the use of ultrasonic vibration** to be induced in the bottles via a direct mechanical coupling, so as to be able to speed up the remuage operation. Advantageously, such ultrasound generates vibrations in the bottles, which cause the lees to slide faster along the natural slopes of the glass of the tilted bottle. The combination of ultrasound and bottle inclination will cause the lees to accumulate quickly in the neck of the bottle, thus speeding up the remuage phase.

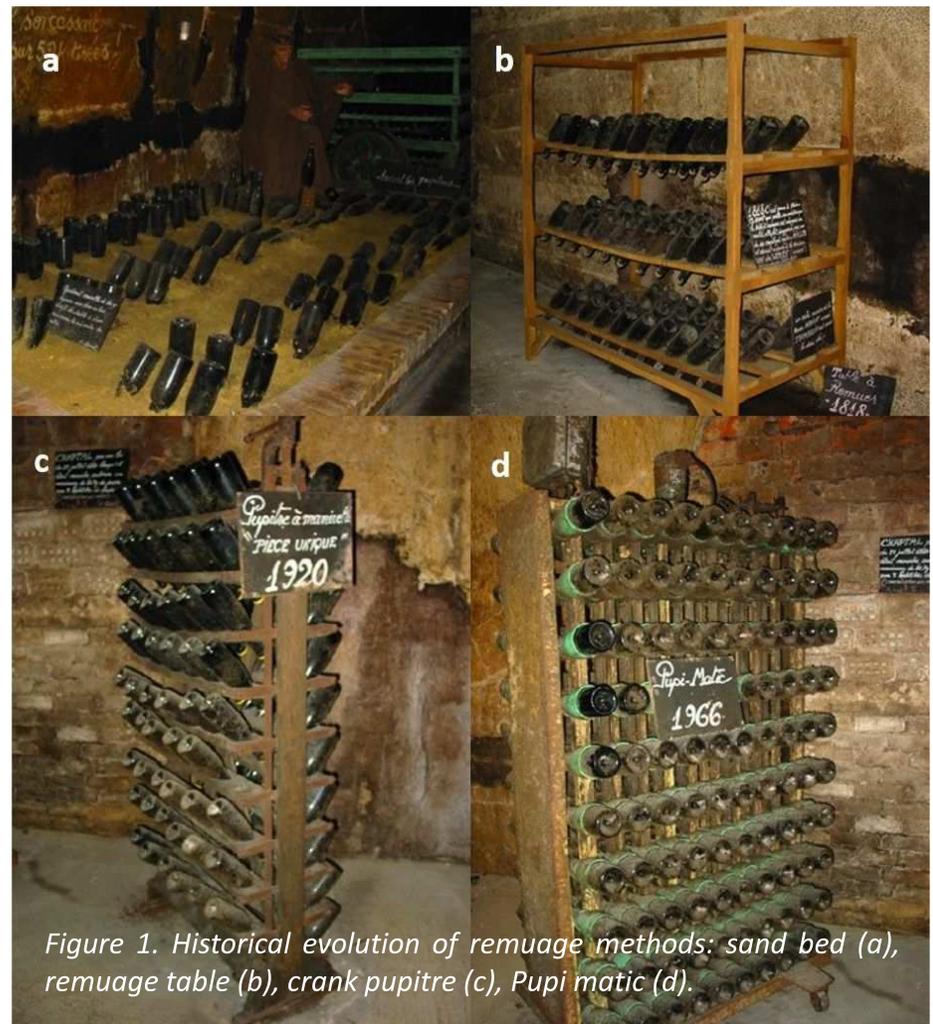


Figure 1. Historical evolution of remuage methods: sand bed (a), remuage table (b), crank pupitre (c), Pupi matic (d).

## Experimental apparatus for ultrasonic remuage

The experimental remuage apparatus comprises a support element configured to hold one bottle in at least one tilted position with respect to the vertical, and comprises one vibrating element configured to be mechanically coupled with the bottle. **Figure 1 schematically shows a first embodiment of the experimental ultrasonic remuage apparatus. The vibrating element is positioned to induce a mechanical vibration at ultrasonic frequencies in the bottle.**

The experimental apparatus is equipped of a control system adapted to operate vibration according to predetermined time intervals and/or at a predetermined oscillation frequency.

The apparatus also comprises a rotation system to change the inclination of the bottle over time with respect to the vertical.

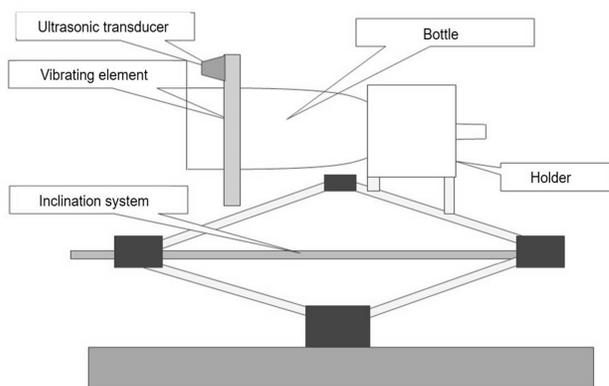


Figure 2. Experimental setup scheme

## Results

The mechanical vibration is generated at predetermined time intervals and/or at a predetermined oscillation frequency, preferably comprised between 20 and 50 kHz. The bottle inclination with respect to the vertical is changed over time and it is combined with a gradual increase in the inclination of the bottle in the overturning direction.

The preliminary experimental tests conducted have shown that the present invention ensures a much shorter remuage time. The traditional remuage method using pupitres takes about 30 days; the more modern remuage method on gyropalette takes about 7 days; **the results obtained by the experimental remuage apparatus showed a completion of the remuage process in approximately 4 hours** (Figure 3).

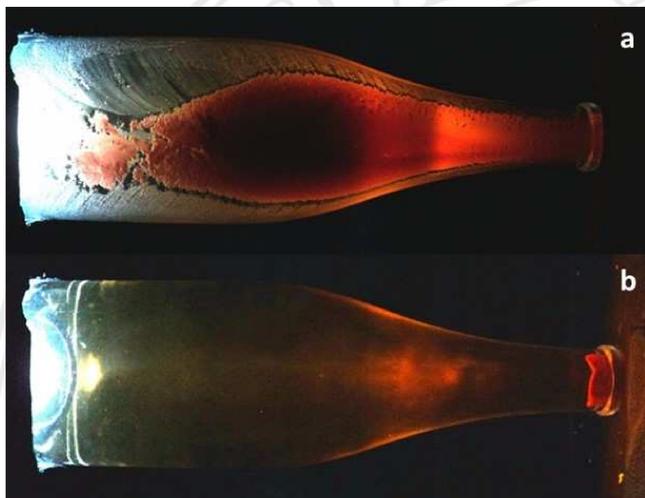


Figure 3. Examples of images taken in a darkroom to evaluate the treatment effect: before (a) and after (b) treatment with ultrasonic vibrations

## Future perspectives

The final objective of the work is to provide a remuage apparatus and a remuage method wherein the duration of the treatment is reduced, allowing the treatment of one or different batches of bottles, resulting in an advantageous and effective solution in improving sparkling wine production and which are attractive for wineries (e.g. to develop a kit for converting existing riddling machine).

The structure of the envisaged apparatus is similar to that of a gyropalette machine, improved in accordance with the present study (Figure 4). **The remuage apparatus comprises a support element configured to hold a plurality of bottles in tilted position, as obtainable with traditional gyropalette machines.** The apparatus further comprises a multi-bottle vibrating plate, on which a plurality of vibrating transducers is applied. The vibrating plate is mechanically coupled with the bottles, and the vibrating transducers are adapted to induce a mechanical vibration at ultrasonic frequencies in the bottles.

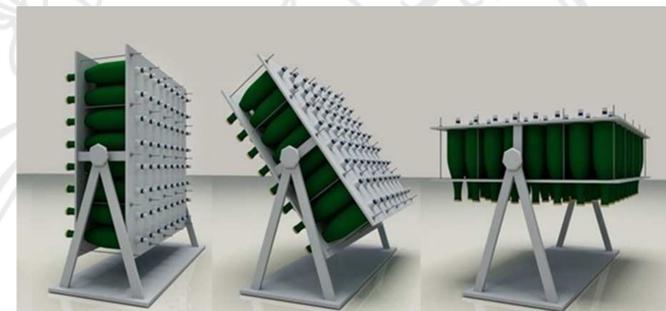


Figure 4. Rendering of a possible solution for the application of piezoelectric transducers on many bottles

Results were encouraging and led to a European patent of the Università degli Studi di Milano (Remuage apparatus and method, EP 3078734 A1)

EUROPEAN PATENT

