

Chêne Développement Newsletter

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Stave yard and microorganisms: a living universe*



At Taransaud, staves that are stored in a yard which measures over 12 hectares, age naturally for at least 24, 30 or 36 months depending on the wood's thickness and grain (certified by Bureau Veritas). They improve as they age, thanks to the Charentais climate, precipitation and temperature variations (see Newsletter 8). So that they can dry gradually through optimal aeration, the staves are piled in discontinuous layers and precisely spaced out to maintain sufficient thicknesses. The pallet density creates a favourable humid microclimate across the yard.

Studies examining stave hygrometry, chemistry, physical-chemistry and microflora have shed light on how seasoning works and what it contributes. The microflora in the wood plays a major role in releasing the aromatic compounds and relaxing the ellagitannins found in the staves. In this part of the newsletter, we are going to break down the development of staves' microflora.

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Protocol

A sampling campaign was undertaken in batches of staves with different ages and positions in the yard. Wood chips taken from the staves' upper 2 millimetres were cultured in a non-selective medium to assess the total aerobic mesophilic flora. After incubation, the colonies were counted. The main strains were then isolated and identified through genetic analysis.

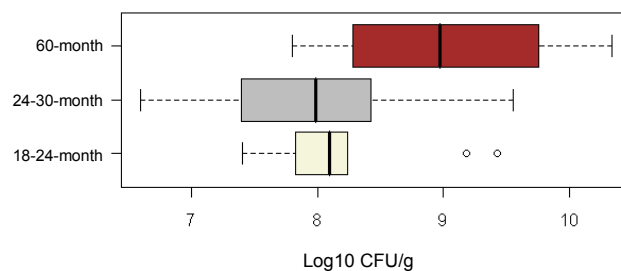
Active role of microorganisms

Microflora	Enzymatic activity
<i>E. gallinarum</i>	Ligninase, xylanase and cellulase
<i>E. casseliflavus</i>	Ligninase, xylanase and cellulase
<i>Bacillus cereus</i>	Cellulase and hemicellulase
<i>Aureobasidium pullulans</i>	Cellulase
<i>Penicillium glabrum</i>	Secondary degradation of cellulose
<i>Penicillium roquefortii</i>	Secondary degradation of cellulose

On staves, there is a high concentration of microorganisms (10^7 to 10^{10} CFU per g of wood), the majority of which are bacteria. Three **bacteria** species (in white) and three **microscopic fungi** (in brown) have been identified (see above table). These are microorganisms that are often found in environments like plant surfaces, water and the soil. This bacterial and fungal microflora has an arsenal of enzymes that are capable of metabolizing wood compounds; it actively contributes to stave ageing. **It is not pathogenic and does not produce toxic compounds.**

Effect of position and time in yard

On a same pile of staves and from one pile to another, the flora is spread out evenly, in terms of the number of colonies and the species present. However, **the length of time spent in the yard has an effect** (see graph below, results expressed in logarithm of colony forming units per g of wood—Log₁₀ CFU/g). On average, 60-month staves (T5) have 10 times more microflora. 18-24-month and 24-30-month staves have similar average levels.



Microflora is essential to **stave seasoning**. A stave yard is colonized primarily by **bacteria**, but also by **fungi**. **Several dominant factors** ensure the even distribution and longevity of the microflora: the layout of the staves and piles, the reach of the yard and the **staves' exposure time** (at least 2 winters). The microflora breaks down and transforms the oak compounds, thereby allowing the oak aromas and flavours that are specific to Taransaud barrels to fully express themselves.