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Hideki

enartis

Inspiring innovation.

*Tannins, like antibodies in the animal world, have the role of protecting plants from external attacks.*

*When a viral, bacterial or fungal infection is underway, tannins limit the growth of the pathogen and the deterioration of the attacked tissue.*

*Tannins can still perform most of these actions after being extracted from the plant making them useful in winemaking for wine protection.*

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## **HOW DO TANNINS PROTECT PLANTS?**

### **Interactions with Proteins**

When a microorganism attacks plant tissue, tannins bind to transport proteins present in the pathogen cell membrane and consequently prevent exchanges with the exterior environment. In the same manner, they bind to enzymatic proteins and inhibit their function. This results in the inhibition of microorganism growth. Over the course of evolution, tannins with different structures and dimensions developed, which interact with different proteins and are efficient against various pathogen species.

### **Metal Chelation**

Metals are cofactors which are necessary for the correct function of many enzymes. Tannins create solid links with many essential metals for cellular metabolism such as copper, zinc, magnesium, etc. Tannins also slow or inhibit microorganism growth by binding with these metals rendering them unavailable.

## **TANNIN USES IN WINEMAKING**

### **Protein Removal**

The capacity to interact with transport and enzymatic proteins of microorganisms provides tannins with a protein removal effect, which is useful for protein stability and improved clarification of must and wine.

### **Metal Removal**

Tannins maintain their ability to chelate and precipitate heavy metals in wine. This allows for the production of wines that are more stable over time, less prone to turbidity and precipitations in the bottle, and are less sensitive to oxidation.

### **Antioxidant Protection**

Oxidation in wine occurs because of free radicals, which are strong oxidants that form in the presence of oxygen and metals, copper and iron. Tannins limit the oxidation process by chelating with metals as well as reacting directly with free radicals.

Hideki

# Hideki

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## WHAT IS HIDEKI?

Hideki was created during research aimed at studying the antioxidant and antimicrobial properties of tannins with different compositions, chemical structure and size. To start, the most effective tannins for winemaking from each category (gallic, ellagic, condensed) were selected. Next, the separation and purification of different molecular weight tannins demonstrated the possibility of expanding the efficacy of the previously selected ellagic and condensed tannins.

Therefore, Hideki is a tannin composed of molecular fractions obtained through the selection and purification of gallic, ellagic and condensed tannins which were the most efficient in terms of antioxidant and microbiostatic action.

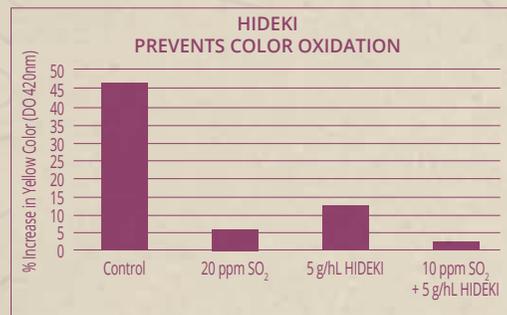
## A “SPLENDID OPPORTUNITY” TO PROTECT WINE NATURALLY

### WHAT DOES HIDEKI DO?

Hideki, which means “splendid opportunity” in Japanese, is a tannin that protects wine from oxidation and the effects of undesirable microbial growth in a natural and efficient manner.

#### Antioxidant Protection

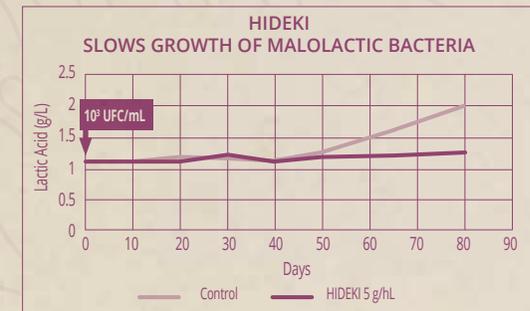
Hideki is composed of tannins with high metal removal and antioxidant capacity. It can be used as an alternative or together with sulfur dioxide to preserve the freshness of wine aroma and color.



White wine with pH 3.5 exposed to air for 10 days

### Prevention of Microbial Spoilage

Hideki slows the growth of microorganisms that can alter wine composition and sensory quality. The combination of tannins with different compositions and chemical structures that have microbiostatic actions against various microorganisms makes Hideki a suitable tool for use across a wide range of pH levels.



Red Wine: pH 3.6 - Free SO<sub>2</sub> 4 ppm - Molecular SO<sub>2</sub> 0.07 ppm

### Hideki Uses

Hideki is used during the final winemaking stages to prepare a wine for bottling:

- As an alternative to SO<sub>2</sub>.
- To inhibit microorganism growth that can alter wine quality once bottled.



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