

Ethyl Carbamate Content in Wines*

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Ethyl carbamate is known for its carcinogenic effect on some laboratory animals; it has not been conclusively proven to be a carcinogen for human beings. Because of the suspicion that ethyl carbamate may pose a health risk, a considerable amount of research has been done. The studies have shown that ethyl carbamate is naturally present in many fermented food products including certain wines. The amount appears to be relatively high in fortified wines and brandies which involve heating in their production. Research has also shown that urea is a primary precursor of ethyl carbamate in certain wines. Urea is a by-product of arginine (naturally occurring amino acid in grapes) breakdown by the yeast.

There are several factors that influence the ethyl carbamate content in wine. One of the important factors is the arginine content of the wine. In one study the ethyl carbamate level was found to increase with higher amounts of arginine in the juice which resulted from the application of high degrees of nitrogenous fertilizer. By controlling the amount of nitrogenous fertilizer, one may be able to control arginine levels in juice and consequently urea and ethyl carbamate levels in wine. It should be emphasized that more research needs to be done since this relationship may not hold true in other cases and nitrogenous fertilization has other effects on juice and wine quality which need to be considered along with arginine content.

The amount of arginine present in the must also depends on the variety in question. It would be helpful to determine the amino acid profiles and particularly the arginine contents of the leading wine varieties to develop a strategy for reducing arginine levels.

The yeasts also play an important role in influencing the ethyl carbamate content in wine. During the fermentation, urea is produced as a by-product of arginine metabolism. The yeast strains differ in their ability to produce urea, excrete urea into must and even reabsorb the urea from the must back into the cells. When urea is present in the must it can react with ethyl alcohol to form ethyl carbamate. The ideal situation would be to develop a strain of yeast which has all the desirable attributes and will produce and/or excrete very little to no urea in the ferment.

While more research is being done to reduce ethyl carbamate in wine, a vintner can also take certain steps to minimize its level in wine. This approach should include careful nitrogen application to reduce arginine levels in juice and using a yeast strain that will produce insignificant amounts of urea during fermentation.

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