PURDUE UNIVERSITY

PURDUE EXTENSION

FS-59-W

Commercial Winemaking Production Series

Traminette Winemaking

How to produce Indiana's signature wine

EXPERT REVIEWED

The white wine grape variety Traminette (Gewürztraminer x J. Seyve 23-416) has been selected to create and promote a signature wine style for Indiana. The Purdue Wine Grape Action Team has determined that Traminette can be one of the most distinctive, productive, and valuable wine grapes in Indiana. We have grown the grapes, produced experimental wines, and evaluated commercial grape and wine production to determine the most suitable wine style for this varietal. This publication provides advice to winemakers on the best commercial production practices for Traminette wines.

Traminette vine with shoots positioned vertically in a vineyard

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Winegrowing

Advice on the best viticultural practices — including vineyard establishment, trellis and canopy management systems, and pest management — is provided by Purdue Extension publication FS-60-W, *Traminette Vineyard Management* (www.extension.purdue.edu/extmedia/FS/FS-60-W.pdf).

Fruit maturity and picking decisions

Sufficient hang time is crucial to let Traminette grapes ripen and fully develop the future wine's delicate and delicious volatile aromas and balanced alcohol and acid structure. In Indiana, this may mean very strict monitoring of evolving pests and diseases and the ever-changing weather conditions around harvest time.

Fruit temperature

Traminette should be harvested as early in the morning as possible to keep the fruit temperature below 65°F as it reaches the winery. Filled picking bins should not sit in the vineyard and reach temperatures above 80°F. If this is unavoidable, the fruit needs to be chilled before processing. This helps to avoid spontaneous fermentations, high volatile acidity (V.A.), and stem/skin tannin extraction from cracked berries and their juice.

As a reference, the average low (night time) temperature in Bloomington is 62°F in August and 55°F in September. The corresponding average high temperatures are 84°F and 78°F.

Berry color assessment

Sun exposure of the berries is essential for the formation of high concentrations of monoterpenes, the main contributors to Traminette's characteristic varietal aroma. A light golden color of the clusters indicates well-exposed mature fruit. Greenish fruit is a sign of an over-vigorous canopy and subsequent fruit shading. Rotten clusters or berries should be sorted/cut out by hand before the fruit is processed. Insects, such as the multicolored Asian lady beetle, also need to be removed by hand as much as possible before the fruit enters the destemmer.

Sugar (Brix)

Target for sugar concentration is 22 +/- 2 Brix (% sugar w/w). Proper berry sampling (200 random berries per vineyard block) is essential for a good assessment of overall fruit ripeness and to avoid surprises once the juice is in the tank.

pH and acidity (T.A.)

Ideally, pH should be around 3.3 +/- 0.2, and titratable acidity (T.A.) should be around 8.0 +/- 1.0 g/L (0.8%).

Destemming and crushing

Processing should occur as soon as the fruit reaches the winery. Traminette grape clusters should first be destemmed and then crushed without significant breaking of stems or cracking of seeds. The must should be as free as possible from stem parts and materials other than grapes. This may require additional sorting though the destemmed or crushed fruit.

SO_2 management at crush

75 mg/L sulfur dioxide should be added to the must. To get a good distribution of sulfites within the crushed fruit, part of the solution below should be added to each batch of must that is moved to the press or intermediate tank after the destemmer-crusher. For each ton (2,000 lbs.) of grapes, dissolve 118 grams of potassium metabisulfite in one gallon of cool, clean, chlorine-free water.

Skin contact and cold maceration

Due to the substantial amounts of monoterpenes in the Traminette berry skin, any deliberate, additional skin contact after crushing the fruit is unnecessary if the incoming fruit was properly ripe and sun-exposed. Over-extraction of Traminette skins (and seeds) leads to harsh wines with aromas that are reminiscent of burnt plastic rather than rose petals.

Note that when doing skin contact with white grapes, the contact time is related to the temperature of the incoming fruit. Skin contact (cold maceration) for t_1 = 12 hours at T_1 = 45°F is equivalent to less than 2 hours at 75°F. To avoid over-extracting, check the actual must temperature. The aroma extraction kinetics may be roughly described as $t = t_1 * 0.33^{(T-45)*0.055}$, which is similar to the formula for color extraction in the production of rosé wines.

Enzyme use

Due to the sufficient amounts of monoterpenes in the Traminette berry skin, release of bound terpenes via the addition and activity of β-glucosidase enzymes is not necessary. Such addition of enzymes would prematurely release most of the terpenes, reducing the aging potential of the bottled wine.

Pressing

Press as gently as possible and avoid pressures of more than 1.2 bars (18 psi) when using a membrane press, which is recommended.

SO_2 management at press

If it wasn't added to the must (see above), 75 mg/L of sulfur dioxide should be added to the juice. For each 1,000 gallons of juice, dissolve 487 grams of potassium metabisulfite in one gallon of cool, clean, chlorine-free water.

Settling

After pressing and SO_2 additions, the juice should be cold-settled overnight, then racked off the gross lees as clean as possible into a temperature-controlled fermenter.

Yeast

A swift and clean fermentation without the production of reduced sulfur compounds is desirable for this varietal.

Traminette's varietal aroma is strong enough to make irrelevant any contributions by the yeast's fermentation bouquet. A strong *Saccharomyces bayanus* strain is recommended. Yeast strains with higher enzymatic β-glucosidase activity are not warranted.

Yeast nutrition

You, or a commercial wine laboratory, should assess the juice nutrient status via the NOPA assay, which can be found at: www.foodsci.purdue.edu/research/labs/enology/NOPA98.pdf

If the juice proves to be deficient of yeast-available nitrogen (YAN), additions of DAP and YAN-contributing technical yeast nutrient products is highly advisable, especially when fermenting at very cool temperatures (less than 60°F).

Fermentation management

A cool and slow fermentation with a gradual evolution of CO_2 gas minimizes the loss of desirable volatile aromas. Good temperature control of the fermenter and/or cellar is required, as the alcoholic fermentation generates heat and can exceed the recommended temperature range.

Temperature range

Traminette juice should be fermented between 55°F and 65°F, and should not exceed 65°F. Temperatures below 55°F extend the fermentation time and make it increasingly difficult for the yeast cells to survive in numbers large enough to finish the fermentation completely.

Duration

The fermentation of a Traminette juice should be complete within two weeks. Longer fermentation times indicate a sluggish or possibly stuck fermentation.

Stabilization and fining

The standard processing procedures below — while not necessarily benefitting the wine's aroma properties — will assure consumer acceptance and shelf life of the wine.

Cold stability

Potassium bitartrate crystals in a wine bottle

"Cold stabilizing" means to rid a wine of unstable potassium bitartrate ("cream of tartar"), the naturally occurring salt of the grape's tartaric acid and the major contributor to a wine's perceived tartness. Since potassium bitartrate is more soluble in water than in alcohol, the amount soluble in wine is smaller than the amount in grape juice. However, due to the presence of colloidal materials in wine, such as mannoproteins, pectins, and other

polysaccharides, the unstable tartrate may not precipitate unless the wine is chilled or aged significantly in tank or barrel, which might not be appropriate for Traminette wine styles. While only an aesthetic issue that requires wine consumer education more than winemaker intervention, the presence of tartrate crystals, which are harmless and tasteless, has raised concerns about potential lawsuits by consumers who mistake the "wine diamonds" for glass splinters. Since the solubility of potassium bitartrate is also much reduced at lower temperatures, the winemaker usually chooses to "cold" stabilize a wine at a temperature just above the freezing point of the individual wine for about three weeks. While a common practice, this is a waste of energy and an example of unnecessary over-processing of a natural product. The wine's freezing point is related most importantly to its alcohol content. The approximate freezing point of wine at 10 percent ethanol by volume is 25˚F, at 12 percent it is 23˚F, and at 14 percent it is 21˚F.

Protein stability

The protein content of Traminette varies greatly by vintage, climate, rootstock, pruning and crop levels, fertilization practices, etc. Proteins cannot be metabolized as yeast-available nitrogen, and their solubility decreases with the wine's alcohol content. This may lead to precipitation of agglomerated proteins in the form of a visible amorphous haze. Proteins\hazes, much like tartrate crystals, are a purely aesthetic, visual problem in wine as they cannot be tasted. However, while it is a natural effect, most consumers prefer a wine free from unappetizing-looking protein instabilities. Bentonite clay in different forms can irreversibly adsorb various sizes of proteins and has been the protein-fining agent of choice.

The quickest check for protein stability are heat tests that expose a wine sample (treated and filtered) to a high temperature for a short period of time, e.g. 120°F for 48 hours or 194°F for one hour, followed by a period of cooling. Such tests are merely an attempt to simulate the precipitation of proteins at a proper, cool storage temperature over the lifespan of the wine.

Bentonite should be rehydrated with clean, chlorine-free hot (140°F) water, by adding it under vigorous mixing to the water (not the other way around) and allowing it to swell for at least four hours. For bench trials in the winery lab, a mixing ratio of 1 part bentonite to 16 parts water (60 grams per 1 liter) results in an easily pipettable 6 percent w/v slurry. In the cellar, bentonite is typically dissolved at ratios of about 8 to 1 (1 pound per gallon of water), which allows for legal bentonite additions of up to 10 lb/1,000 gal. Rehydrating with too little water will limit the amount of swelling and makes for a difficult-to-stir, lumpy slurry. At least 10 to 15 minutes of vigorous mixing is recommended, and the wine temperature should be above 10°C (50°F).

Table 1: Bentonite (6%) slurry additions for protein fining bench trials.

g/hL	lbs/1,000 gal	mL per liter wine	mL per 750mL wine	mL per gal wine
12	1	2	1.5	8
24	2	4	3.0	15
36	3	6	4.5	23
48	4	8	6.0	30
60	5	10	7.5	38
72	6	12	9.0	45
84	7	14	10.5	53
96	8	16	12.0	60
108	9	18	13.5	68
120	10	20	15.0	76

Color management

Traminette juice can turn brown quickly, especially if a *Botrytis cinerea* infection produces a relevant amount of the polyphenol oxidase (PPO) laccase, which does not respond to SO2 additions to the juice the way the grape's own PPOs do. Traminette wine should have a light straw color in the bottle. If there is still significant browning after the fermentation is over and the wine has settled, a treatment with the fining agent PVPP (polyvinylpolypyrolidone) may be in order. The dosage should preferably not exceed 1 lb/1,000 gal, and a bench test is highly recommended before treating the entire batch. After fining and settling, the wine should be rough filtered to remove pigment and fining agents.

Stylistic options

To guarantee diversity among Traminettes from different wineries and microclimates within Indiana, and to offer consumers choices, the recommendations below should be considered as suggestions based on

commercially successful winemaking practices. If one wishes to produce a barrel-aged, bone-dry white wine that has gone through malolactic fermentation, then hats are off to the winemaker who can market and sell it!

Acidity

A nice crispness is a quality attribute of this cool-climate white wine style.

The titratable acidity (T.A.) after cold stabilization should be around 7.5 g/L (0.75%). While this is a house style choice, significantly higher acidity may make the wine appear sour, while lower acidity may result in wine that seems flabby and unbalanced.

Residual sugar

To balance the acidity and alcohol content of a young Traminette, a modest sugar addition is usually advisable even for a "dry" style wine. At a T.A. of 0.75% for example, a residual sugar (R.S.) concentration of 7.5 g./L will not cause any perceivable sensation of sweetness in the wine but will round out any harshness.

At around 15 g/L, the wine will likely appear nicely balanced with a touch of sweetness balancing the desirable crispness. Levels of 30 g/L and above will create a popular off-dry style suitable for either table wines or dessert wines.

Malolactic fermentation

Traminette is traditionally not put through malolactic fermentation (MLF). To prevent a spontaneous MLF, proper free SO_2 concentration according to the pH of wine must be maintained. At chart of free SO_2 requirements in wine can be found at: www.foodsci.purdue.edu/research/labs/enology/FreeSO2(pH)Pro.pdf

Deacidification

If the fruit had to be picked under-ripe in the vineyard, excess acidity can be adjusted to a certain extent with potassium bicarbonate, which does not cause stability problems associated with calcium salts. The recommended treatment limit for potassium bicarbonate is 1,000 mg/L, which neutralizes the equivalent of 1.5 g/L T.A. Deacidifying a wine with 1,000 mg/L $KHCO_3$ will add 386 mg/L potassium. Higher doses would make the wine taste salty. This substantial increase in potassium will require cold-stabilization after the treatment.

Sur lie aging

Aging on the yeast lees is recommended, as the subsequent release of mannoproteins adds to the mouthfeel of the wine. The aging on the settled lees may be conducted in a stainless steel tank for up to six months. Constant monitoring for reduced sulfur compounds (H_2S, mercaptans) is needed, and the wine must be racked as soon as it appears to smell *stinky* (odors reminiscent of rotten eggs, skunk, garlic, rubber, etc.). A biweekly "stirring" of the lees by mixing the tank with nitrogen or argon gas through the racking valve is recommended to avoid reduction and assist with the release of mannoproteins.

Barrel aging

Neither barrel fermentation nor barrel aging is suggested for Traminette wines unless the oak container is large and more than five years old, i.e., it does not contribute any oak aromas to the wine, which would mask its varietal character.

Bottling considerations

Sorbate management

Sorbic acid is the main antimicrobial adjuvant used to prevent a wine's alcoholic refermentation in the bottle by yeast, including the common wine yeasts *Saccharomyces cerevisiae* and *bayanus*. The maximum (and required!) dose is 200 mg/L sorbic acid. Sorbic acid is sold and applied in the form of its highly soluble salt, potassium sorbate, and 268 mg of potassium sorbate equal 200 mg of sorbic acid, so the dosage needs to be adjusted accordingly (1,014 g/1,000 gal).

SO_2 management

Before (and after) bottling, the wine has to meet the free SO_2 requirements that correspond to its pH to prevent malolactic fermentation in the bottle or premature oxidation and browning.

In addition, and depending on the sophistication of the available bottling line, between 10 and 30 mg/L SO_2 should be mixed into the wine to account for SO_2 losses during the bottling process, including filtration, filling, and closing. When using a simple gravity-flow

filler without sparging the bottle or its headspace with nitrogen, an extra 50 mg/L may be advisable. 3Be aware though, that this addition of potassium (metabisulfite) may compromise the (tartrate) cold stability of the wine. www.foodsci.purdue.edu/research/labs/enology/FreeSO2(pH)Pro.pdf

Bottle aging

Traminette wines may be bottle-aged to release further bound aroma compounds, but the storage recommendations below should be followed (Table 2). It can also be released as early as two weeks after bottling.

Storage and shelf life

The table below contains storage temperature recommendations for all wines.

The shelf life of Traminette depends on the storage conditions, but it is advisable to release the wine about nine months after harvest, to sell it within one year of release, and to consume it within two years after harvest.

Table 2: Recommended storage temperatures for wine.

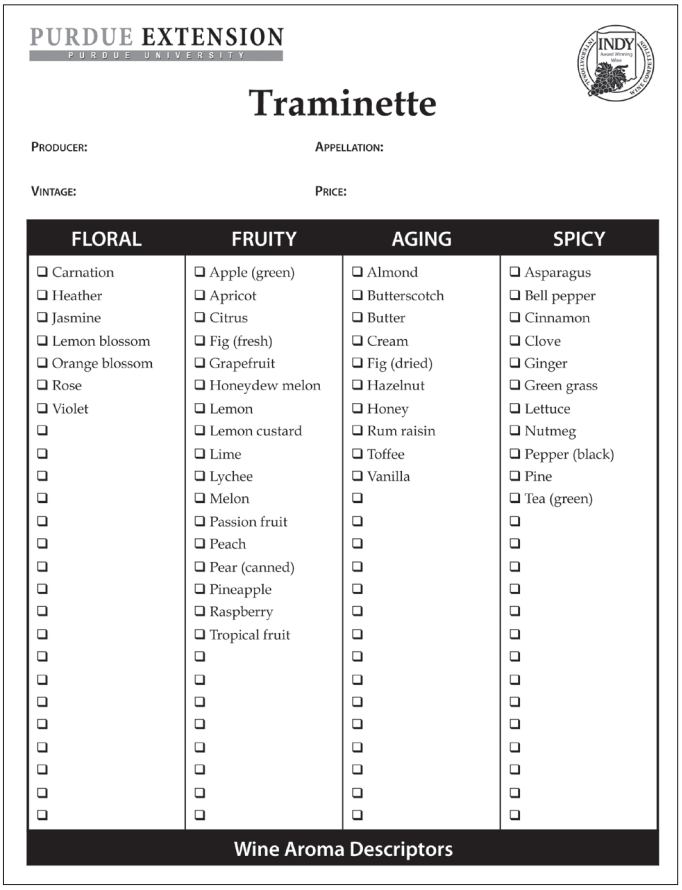
Heat Exposure	
Storage Time	***Temperature***
Never	30°C (86°F) or above
Spikes of 30 min or less	29°C (85°F) or below
1-4 weeks	24°C (75°F) or below
Long-term storage	10 to 16°C (50 to 60°F)
Cold Exposure	
Storage Time	***Temperature***
Never	-5°C (23°F) or below
Spikes of 30 min or less	0°C (32°F) or below
1-4 weeks	10°C (50°F) or below
Long-term storage	10 to 16°C (50 to 60°F)

Source: www.foodsci.purdue.edu/research/labs/enology/Wines2008.pdf

Aroma descriptors

Below is an excerpt from the *Wine Aroma Descriptor Manual*, Purdue Extension publication FS-15, available for $20, plus shipping, at https://mdc.itap.purdue.edu/item.asp?item_number=FS-15

This can be used by the winemaker and winegrower to evaluate, compare, and discuss the wines, write label descriptions, train tasting room staff, and educate consumers about Traminette.



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Traminette

PRODUCER: APPELLATION:

VINTAGE: PRICE:

FLORAL	FRUITY	AGING	SPICY
❑ Carnation	❑ Apple (green)	❑ Almond	❑ Asparagus
❑ Heather	❑ Apricot	❑ Butterscotch	❑ Bell pepper
❑ Jasmine	❑ Citrus	❑ Butter	❑ Cinnamon
❑ Lemon blossom	❑ Fig (fresh)	❑ Cream	❑ Clove
❑ Orange blossom	❑ Grapefruit	❑ Fig (dried)	❑ Ginger
❑ Rose	❑ Honeydew melon	❑ Hazelnut	❑ Green grass
❑ Violet	❑ Lemon	❑ Honey	❑ Lettuce
❑	❑ Lemon custard	❑ Rum raisin	❑ Nutmeg
❑	❑ Lime	❑ Toffee	❑ Pepper (black)
❑	❑ Lychee	❑ Vanilla	❑ Pine
❑	❑ Melon	❑	❑ Tea (green)
❑	❑ Passion fruit	❑	❑
❑	❑ Peach	❑	❑
❑	❑ Pear (canned)	❑	❑
❑	❑ Pineapple	❑	❑
❑	❑ Raspberry	❑	❑
❑	❑ Tropical fruit	❑	❑
❑	❑	❑	❑
❑	❑	❑	❑
❑	❑	❑	❑
❑	❑	❑	❑
❑	❑	❑	❑
❑	❑	❑	❑
❑	❑	❑	❑
❑	❑	❑	❑

Wine Aroma Descriptors

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