



EASTERN INSTITUTE OF TECHNOLOGY  
TE AHO A MĀUI

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**REPORT TO:**

**Agrothermal Systems Limited**  
205 Farndon Road  
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HASTINGS 4172

**Introduction**

In 2017 Agrothermal Systems Limited contracted the EIT winery to produce wine from trials on Gewurztraminer and Merlot grapes.

The grapes were identified as follows:

Gewurztraminer

GW3 Control  
GW2 12 days  
GW1 6 day

Merlot

T3 Control  
T4 6 days no sprays  
T2 12 days

**Microvinification Methods**

The red grapes were fermented on skins following the general processing schedule for red grapes (see Fig.1.)  
The white grapes were fermented off skins following the general processing schedule for white wines (see Fig.2.).

This report outlines the wine making techniques used to produce the wine. It also lists results of the main chemical analyses of the grapes and the respective wines.

**Eastern Institute of Technology**

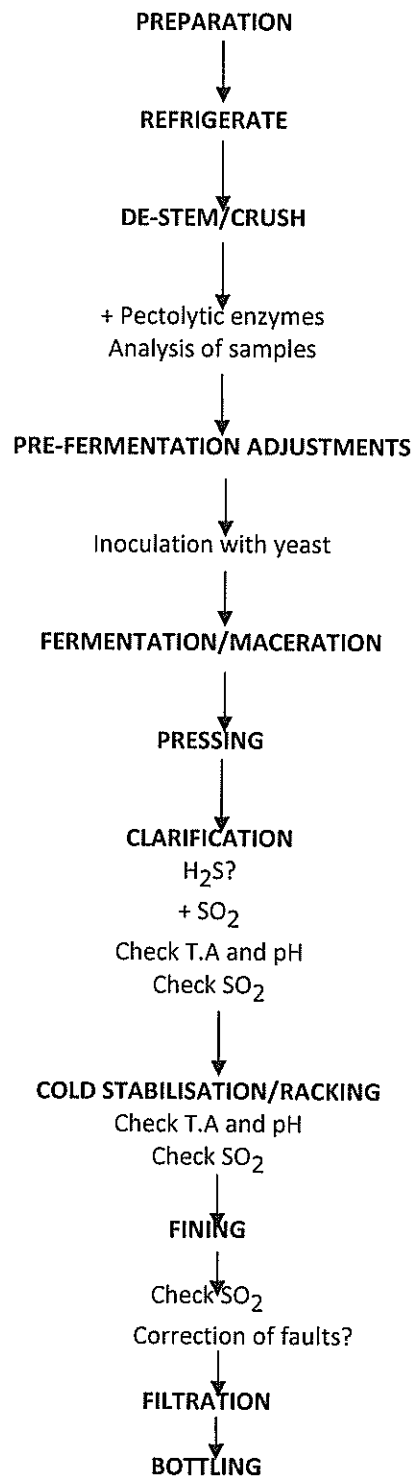
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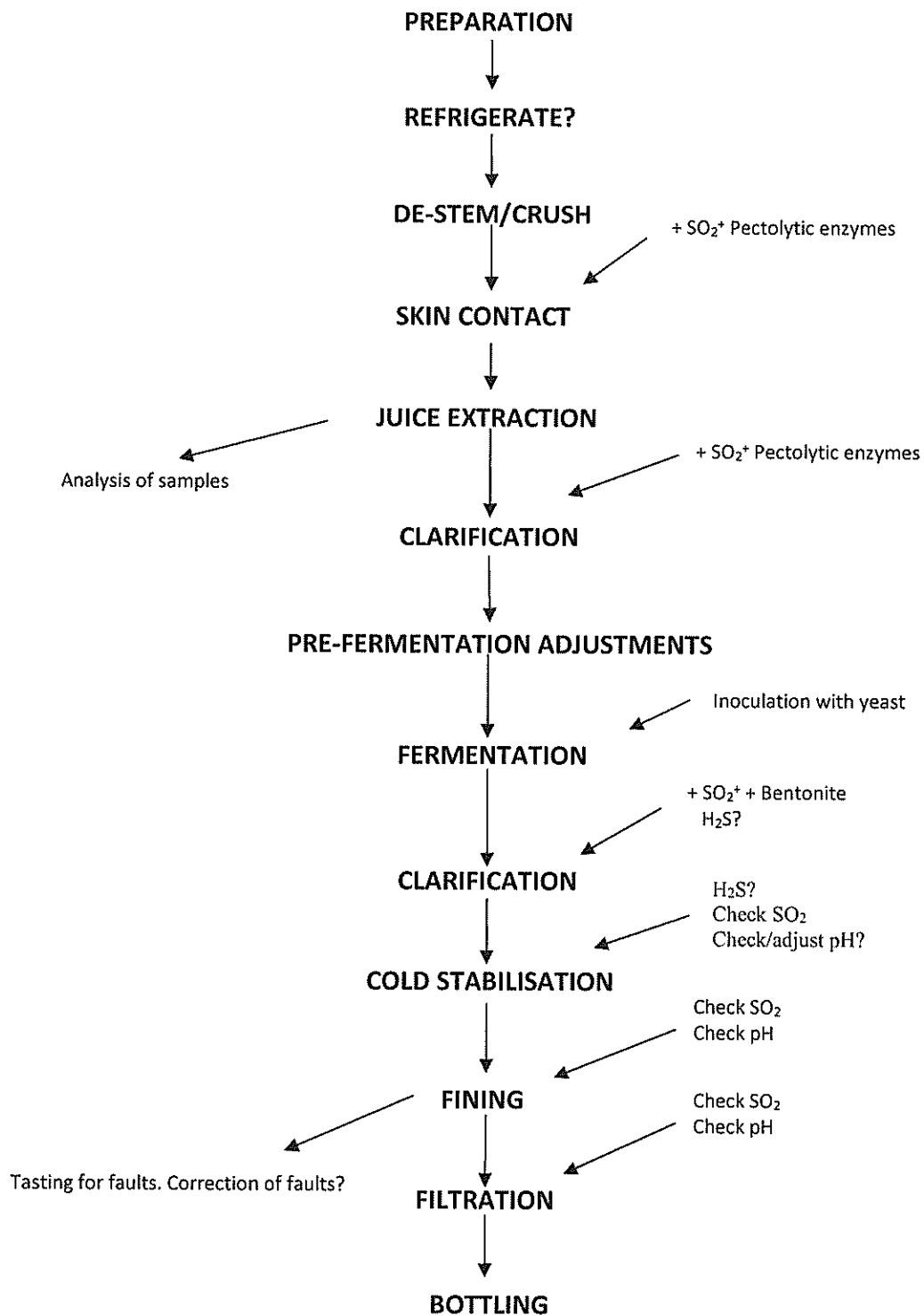
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**Figure 1: Flow diagram for the Microvinification of Red Wine Varieties at EIT Winery**



**Figure 2: Flow diagram for Microvinification of White Wine Varieties at EIT Winery**



### Condition

The Merlot grapes were in good condition and no sulphur was added. The Gewurztraminer had a bit of botrytis and sulphur was added.

### Processing

The grapes were immediately processed after arrival. The grapes were destemmed and crushed through the Bucher-Vaslin Delta E2 crusher destemmer in the order directed (control then lowest to highest treatment) into plastic fish bins. The sides of the crusher were squeegeed down between treatments. (Complete washing out of the destemmer/crusher between treatments causes too much dilution of the subsequent batch due to wash water retention). Pectic enzymes were added and sulphur was added to the Gewurztraminer fruit. Samples of the Merlot juice were taken at this stage and the Gewurztraminer samples were taken for juice analysis after the juice was pressed off (Table 1).

The Merlot fruit (for on skin ferments) was then warmed to 15°C and inoculated with EC1118 yeast at a rate of 300ppm. Diammonium phosphate (DAP) and Fermaid A were added three times at a rate of 100ppm over the first couple of days of ferment (total of 300ppm), to provide the yeast with a good supply of nutrients.

The Gewurztraminer fruit was pressed off skins through the "Pillan" water bag press. This juice was transferred to plastic containers under CO<sub>2</sub> gas cover. Samples were taken for juice analyses before adding 1 g/L bentonite to the treatments and moving to the cold room (-2°C) to settle overnight. The following day they were racked off lees under CO<sub>2</sub> gas cover, and because the pH was high and T.A low, 3g/L tartaric acid was added to each treatment. The juice was then warmed to 14°C and inoculated with Anchor Vin 13 yeast at a rate of 300ppm. Diammonium phosphate (DAP) and Fermaid A were added three times at a rate of 100ppm over the first week of ferment (total of 300ppm), to provide the yeast with a good supply of nutrients.

### Fermentation

For the Merlot, fermentation was in the warm room at 25°C. The caps were plunged daily and Brix and temperatures were taken. The ferments were inoculated with viniflora oenos for malolactic fermentation after eleven days of fermenting. After fourteen days they were pressed off and left in the warm room for another week until malolactic fermentation (MLF) was complete. They were then racked off lees, sulphured and moved to the chiller @-2°C. A week later, FSO<sub>2</sub> levels were checked and adjusted if necessary, T.A and pH were checked and the wines were then moved back to the chiller for eight more weeks. The wines were racked off lees under gas cover, SO<sub>2</sub> was adjusted to 0.5 ppm molecular SO<sub>2</sub> (MSO<sub>2</sub>), Titratable Acidity (T.A) and pH were checked, and the wines were left in the winery to warm up at ambient temperature prior to bottling. Two weeks later, the wines were racked, under gas cover, into stainless steel pressure containers ready to be filtered (as below) and free sulphur dioxide (FSO<sub>2</sub>) levels were checked and adjusted to 0.5ppm MSO<sub>2</sub> prior to course filtration.

For the Gewurztraminer, the ferments were temperature controlled in the refrigerated container at 14°C. Brix and temperatures were taken daily. The ferments took fourteen days to ferment to dryness. Once dry, SO<sub>2</sub> was added and they were then moved to the cold room (-2 °C). A further 1g/L of bentonite was added. A week later, they were racked off lees under CO<sub>2</sub> gas cover and free sulphur dioxide (FSO<sub>2</sub>) levels were checked, as were the T.A and pH, and the wines were returned to the cold room. After two months in the cold room, the wines were racked off lees and FSO<sub>2</sub>, T.A and pH were again checked, then the wines were moved to the winery to equilibrate for two weeks prior to bottling. The wines were tasted and it was decided that sugar wouldn't be added to the wines to balance the acid (in hindsight I think a little sugar would have helped balance the wines or less acid should have been added initially). The wines were racked, under gas cover, into stainless steel pressure containers ready to be filtered (as below) and free sulphur dioxide (FSO<sub>2</sub>) levels were checked and adjusted to 0.8ppm MSO<sub>2</sub> prior to sterile filtration.

### Filtration

The wines were racked into stainless steel pressure containers (under CO<sub>2</sub> gas cover) and coarse filtered through 0.8µm pads in a plate and frame filter. Nitrogen gas was used to pressurise the containers. New pads were used for each treatment and the first ~500mls was discarded at the beginning of filtration. FSO<sub>2</sub> levels were checked and adjusted, if required, then the red wines were filtered into new bottles, that had previously been filled with nitrogen gas, and screw capped. The bottles were labelled, and a middle bottle from each treatment was kept for final analysis (Table 2). The wines were put into labelled boxes, to be collected by Agrothermal Systems.

The white wines were course filtered as above, FSO<sub>2</sub> levels were checked, adjusted if required, then sterile filtered through 0.3 µm pads, using the same process, into bottles.

**Results**  
**Table 1: Initial Juice analyses**

Wine ID	T.A	pH	Brix
Gewurztraminer GW3 Control	4.77	3.55	21.4
Gewurztraminer GW2 12 days	4.62	3.61	21.2
Gewurztraminer GW1 6 days	5.13	3.59	21.0
Merlot T3 Control	7.29	3.27	20.2
Merlot T4 6 days no sprays	8.32	3.20	19.1
Merlot T2 12 days	8.20	3.20	20.1

T.A: titratable acidity as g/L tartaric acid

**Table 2: Final Wine Analyses**

Wine ID	FSO <sub>2</sub>	TSO <sub>2</sub>	T.A	pH	R.S	% Alc	Brix
Gewurztraminer GW3 Control	18	93	6.09	3.03	1-2	11.7	-2.3
Gewurztraminer GW2 12 days	14	80	5.95	3.01	1-2	12.1	-2.4
Gewurztraminer GW1 6 days	14	68	6.47	2.96	1-2	11.9	-2.2

% Alc: Percent Alcohol vol/vol determined by ebulliometer  
 FSO<sub>2</sub> and TSO<sub>2</sub>: Free And Total sulphur dioxide as mg/L  
 T.A: Titratable Acidity as g/L tartaric acid  
 R.S: Reducing Sugar as determined by Clinittest/Aimtab pill test in g/L

Wine ID	FSO <sub>2</sub>	TSO <sub>2</sub>	T.A	pH	R.S	% Alc	Brix	VA
Merlot T3 Control	26	58	5.38	3.53	4	10.8	-1.3	0.32
Merlot T4 6 days no sprays	19	51	5.64	3.44	4	10.6	-1.5	0.34
Merlot T2 12 days	22	52	5.56	3.45	4	11.5	-1.6	0.34

% Alc: Percent Alcohol vol/vol determined by ebulliometer  
 FSO<sub>2</sub> and TSO<sub>2</sub>: Free And Total sulphur dioxide as mg/L  
 T.A: Titratable Acidity as g/L tartaric acid  
 R.S: Reducing Sugar as determined by Clinittest/Aimtab pill test in g/L  
 VA: Acetic acid as determined by Megazyme enzymatic kit in g/L

**Table 3: Winecloud Analyses**

Wine ID	Variety	Free Anthocyanins	Total Tannins	Total Pigments	Total Phenolics	Pigmented Tannins
T3	Merlot	12.83	0.54	13.67	34.94	0.50
T4	Merlot	9.63	0.66	11.02	34.88	0.83
T2	Merlot	13.54	0.78	14.59	39.47	0.63

Tannin recorded in g/L epicatechin equivalents

Other results recorded in Absorbance Units (AU) and are therefore comparative results not quantitative

The samples for the Winecloud analyses were taken from the bottled wine analyses samples.

Sensory analyses of the wines were not carried out by EIT.

Attached to the report are the Intake and Ferment Sheets and Post Ferment Sheet for each treatment.



K. Ball

Winery Technician

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