



Praktikrapport

Henry of Pelham

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INTRODUCTION

During the last ten years, the number of vineyards in Denmark have increased heavily. This is mainly due to the development of new hybrid grape varieties. These hybrid varieties have greater resistance to the pathogenic fungi diseases than the original *vinifera* varieties (Liu et al., 2015).

The problem for the Danish wine industry is the lack of experience. It will be necessary to look at, and learn from countries, who have gone through the same evolutionary stages as the Danish winegrowers are facing in these moments. A Country which was in the same situation just 30 years ago, is Canada. Today Canada grows the same *vinifera* varieties as they do in France and Germany (Hope-Ross et al., 2006).

The goal for this internship is thereby to learn and observe how a Canadian winery is dealing with all the challenges that a new wine country is facing. Because winegrowing and making is such a huge subject, the internship report is limited to answer the following **learning objectives**:

1. *Get knowledge and understanding of the vineyard's fertilizer strategy and pest control*
2. *Develop skills for using the basic equipment in a winery*
3. *Understand and assess theoretical and practical issues related to which factors that are crucial for the optimal harvesting time of grapes for sparkling wine*
4. *Understand the selection of specific yeast-types for specific wines*
5. *Gain greater insight into the chemical processes in the winemaking / fermentation*

The answers to my learning objectives will mainly be based on the notes that I wrote down during my internship, statements from the winemakers at Henry of Pelham (HOP) and empirical data from the winery's lab notes. The report will be written with references like a normal assignment. All the references in the report are statements from employees at HOP. Meaning that when a reference is used, the statement has occurred during my internship. The stated arguments are knowledge I have been told and learned during my time at HOP.

The target group for this internship report is the company which hired me for an internship, Henry of Pelham.

1 PERSONAL GAIN

I did not have that much time in the vineyard during my internship. So, the learning objectives regarding vineyard management, have been fulfilled solely by interviewing the vineyard managers Matt Speck and Justin Willys. Instead, I have to a large extent had some hands-on experience with the basic equipment in the winery. I was trained carefully with each piece of equipment. Everything from a simple pump to a scissor lift and harness training was instructed very carefully and professionally. The learning objective regarding the basic equipment is in my opinion fulfilled to a very satisfying level. During the last half of my internship, I had more independent jobs where I confidently could use the basic equipment on my own.

Because harvesting at the right time is very crucial when making wine, especially sparkling wine, the learning objective regarding harvesting grapes for sparkling wine was very important to me. The strategy, for monitoring when the grapes are ready, was a big part of the decision, as well as the measurement and the calculation in the laboratory. The days I spend with the winemakers in the field and in the laboratory was very useful for my learning objective.

The last two learning objectives regarding fermentation and the yeast selection was an ongoing process during my internship. I was often teamed up with different people in the winery, and many of them have a winemaker education. The time that I had with all the skilled employees, gave me the opportunity to ask all the questions that I needed to fulfill my learning objectives.

I have definitely felt challenged during my time at HOP, but on a level where I really believed it helped improve my skills and knowledge. I have developed a lot of new skills and gained a much better understanding of all the different processes that are happening in a winery's cellar.

Because this internship differs a bit from the education's main topics, I had difficulties contributing with new knowledge to HOP. However, the knowledge I had from previous internships and the understanding of microbiological processes were often adequate to solve the problems I was facing during my daily tasks at the winery. I was able to help out where it was needed, and thereby relieve some of the pressure from other employees. I feel like HOP still have had great value of my time and work at the winery. The last part of my internship was during the harvest season (the busiest time of the year). At that time, I had become confident with the standard equipment and the daily job routine, so my help was very appreciated. In the following section I will describe the experience and tasks that leads to the answer of my learning objectives.

2 EXPERIENCE AND TASKS DURING THE INTERNSHIP

2.1 VINEYARD MANAGEMENT

As described in the previous section, I did not have the opportunity to work in the fields. Because the winery is quite big, the field and cellar work is handled by two different teams, and it were therefore not possible to participate in field. So, to answer my first learning objective, I contacted different people in charge of vineyard management. It is mainly Justin Willys who takes care of the fields and knows what's happening during the different parts of the year. I asked him about how they handle different pests like insects and fungus, as well as their fertilize strategy.

2.1.1 Insects

There are three main insects that are causing problems for growth of the vines and grapes at HOP. Leafhopper, Japanese beetle and last phylloxera, which is best recognized by characteristic galls on the leaves. They will often attack the new shoots, which result in non or very few new photosynthesis active leaves. The biggest problem is seen in the variety *Baco Noir*, which is HOP's signature grape (See figure 1) (Willys, 2019).



Figure 1: *Baco Noir* attacked by *phylloxera* (Christensen, 2019).

2.1.2 Fungus

The biggest problem caused by fungus in the vineyards are Downy Mildew (*Peronospora*), and Powdery Mildew (*Erysiphe*) both of them thrive in hot, humid weather. The winery's strategy against fungus is to be preventive, and minimize the condition that the fungus thrives in. When a block of vine plants is attacked the vineyard-manager have an arsenal of sprays to choose from. A wide selection of pesticides is an advantage, because it gives a wider range of active substances and thereby minimize the potential risk that the fungus develop resistance (Willys, 2019).

2.1.3 Fertilizer

The winery is using several ways to supply their vineyards with nutrition. In the spring the vineyards receive granulated fertilizer together with a mix of manure, last year's grape skin and seeds. The grape skin and seeds are mixed with manure in the fall after harvest and left to composting over the winter. During the growing season, the vines are sprayed with a leave fertilizer. In the autumn, the vine plants receive special fertilizer high in potash, which purpose is to harden-up the shoots from this year, so they are ready to shoot next season and better protected from frost (Willys, 2019).

2.2 THE BASIC WINERY EQUIPMENT

Jobs like cleaning tanks, transferring and filtering wine, was often part of my daily tasks during a day in the winery. The tasks were pretty simple and gave me the opportunity to work with all the

basic equipment in the winery. During these tasks I have become comfortable using equipment like different styles of pumps and filters.

2.2.1 Cleaning tanks

Cleaning the inside of a stainless-steel tank is something every winery must do. Nonetheless, it can be done in many ways and with tons of different products and techniques. In my case, I learned it the way they do it at HOP, which to me seems like a reasonable way to do it (See figure 2). The procedure is described in the appendix.

2.2.2 Transfer wine

Transferring wine from one tank to another is an important logistic job. It can be necessary before harvest, because some tanks are better positioned or equipped to receive fresh juice from the field (Zou, 2019). Normally a winery will use one of the better pumps for this job. If the pump starts leaking or breaks, it can lead to a big loss for the winery. If a pump breaks down under a cleaning, the problem is far less costly. (Woody, 2019):

2.2.3 Filtering wine

The wine was often filtered either with a crossflow of a regular pad filter. The crossflow filter consists of 4 cylinders, in which there are many tiny tubes with holes all as small as 0,2 μm . All particles that's bigger than 0,2 μm will not go through the holes and thereby be stuck in the filter. The particles will often be Proteins, Bentonite or Pectin. Every 300 seconds the filter does a back flush, removing all the particles (sediment) from the small holes in the tubes (Zou, 2019).

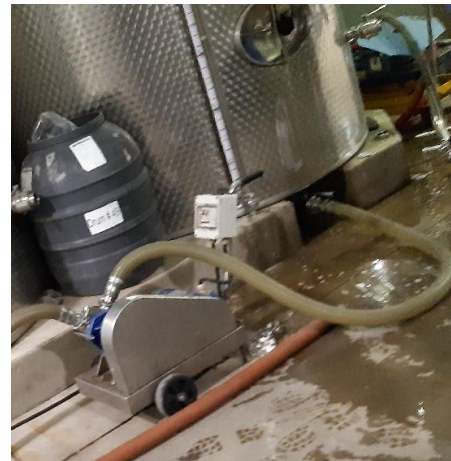


Figure 2: Cleaning cycle. The tank contains soap and water, which the pump is pumping from the bottom valve to the top (Christensen, 2019).

2.3 SAMPLING GRAPES FOR SPARKLING WINE

The third learning objective was regarding optimal harvesting of grapes for sparkling wine. I was with the winemakers out in the field to learn how they are collecting grapes for sampling, and afterwards how they measured the juice in the laboratory. The procedure is described underneath.

The sampling consisted of 20 clusters taken from 4 different rows. One simply just walks up between two rows to cut down 5 randomly chosen clusters from each side. It's important that no clusters from each end of the rows are chosen. They will get more sun than the rest of the clusters and will thereby contribute to an incorrect image of the general condition of the grapes. (Buhler, 2019).

Normally the winemaker will taste the grapes in the field to experience which aromatic compound they contain. But for sparkling wine, it is almost only the laboratory measurement that matters. The right balance between sugar and acid is decisive. So, the decision about when to harvest the grapes for sparkling wine, is based almost 100 % on the laboratory measurement. The fruity aromatics aromas will only play a secondary role in the sparkling wines final taste. The dominant taste in sparkling wine comes from the yeast cells, or rather the dead yeast cells also called the "lees". When wine is aged on its lees, it will obtain the distinctive yeasty aromas and tastes (Buhler, 2019).

The grapes are simply crushed in the plastic bag, by stepping on it with boots. The juice is then separated from the crushed grapes with a colander, and the juice can then be measured with Foss (an analyzing tool using infrared light) and a refractometer (See figure 3) (Silverthorne, 2019).

2.3.1 Result of the sampling

Table 1 result of the pinot noir grapes which were harvested Aug 19, 2019. The measurements were done with a Foss and a refractometer.

	FOSS	REFRACTOMETER
Total acid	20,3 g/l	
-Malic acid	10,1 g/l	
-Tartaric acid	6,2 g/l	
Brix (% sugar)	12,9	13,1



Figure 3: Freshly pressed grape juice, ready for laboratory measurement (Christensen, 2019).

Before the harvest can begin, the grapes need just the right amount of sugar and acid. It is normally the winemaker who decides when the grapes are ready. At HOP the target content of sugar in grapes for sparkling wine is between 17-17,5 Brix, and the target content for total acid is around 11 g/l (Silverthorne, 2019).

According to the winemakers at HOP the harvest is still 10 days away from the date of the sampling. However, it can be very hard to predict when the grapes are ready for harvest. On a perfect warm and sunny day, a grapes content of sugar can be raised by 1 Brix per day (Seguin, 2019). The right timing is thereby a matter of days.

2.4 ADDING YEAST

When the harvest began, inoculation became part of the daily tasks. I helped and observed other employees adding the yeast to the wine a couple of times before I could do it alone. The process needs to be done with care to avoid any harm to the yeast cells. It is important when yeast is added to the grape must, that it's done in the form of a "starter culture", which purpose is to provide the yeast with the right nutrients and acclimatizing it to the acidic environment in the grape must (the procedure is described in appendix). When rehydrating the yeast in water, it's important not to use a mechanical mixer as this can shear the yeast cells (Woody, 2019).

At HOP, the "Starter culture" is often added together with "Fermaid K", which is a yeast nutrition product for alcoholic fermentation. Fermaid K mostly consists of inactive dry yeast that the active yeast cells can feed on (See, 2019).

2.5 THE CHOICE OF FERMENTING STYLE

The fifth and last learning objective about fermentation, could be answered in several ways. During the different jobs at HOP, I often asked about the fermenting processes in the different wines. The answer was often related to the fermenting temperature and sometimes to the yeast strain.

E.g. the cold fermentation allows the wine to obtain the uniqueness of the specific grapes and helps the terroir shine through. On the other hand, the warm fermentation proceeds quicker, but lacks the characteristic of the grapes and its terroir. The yeast for a warm fermentation needs to work fast and thrive in a warm environment (Woody, 2019).

3 CONCLUSION

At HOP the vineyard management spreads over a wide range of different pests and threats. When it comes to fungi and insects, the winery is very focused on being preventive by making a pest control strategy that hinder the main pest from thriving in the field before they attack. The fertilizer in the field comes from composted grape skin and seeds, manure, leaf- and granulated fertilizer.

During my time at HOP I gradually gained more and more responsibility and thereby more independent jobs. During these jobs, I had the time to learn and to become comfortable with the equipment. The jobs ranged from cleaning tanks to adding additions to wine and doing pump-overs on red fermenting tanks. These jobs all require using the basic equipment in the winery.

The decision on when to harvest grapes for sparkling wine is almost 100% dependent on laboratory measurement of the different components in the juice. Especially the ratio between sugar and acid is crucial for the right balance in the final wine. At HOP the winemakers wants the sugar contents to be between 17-17,5 Brix, and the target content for total acid is around 11 g/l.

Selecting the right yeast strain for a specific wine is crucial for the result of the wine. A wrong choice of yeast can either lead to disharmony in the aromas in the wine or at worst, a stuck fermentation because the yeast cells couldn't survive in the environment, they were inoculated in.

Before adding a yeast culture to a tank of grape must, it's important to prepare the yeast cells as much as possible. The yeast will benefit from having an extra shot of nutrition when being rehydrated, and then slowly introduced to more and more juice before being pumped into the tank. This will increase the chance for a successful fermentation.

Overall, I feel like all of my learning objectives have been fulfilled to some extent. I could have wished for more hands-on experience in the fields and a bigger insight to the fermenting processes that occurs while I was at the winery. That being said, I was very happy and grateful with my internship, I felt like, I was given responsibility and the time to learn what I find the most interest in. The employees at HOP were very kind and skilled, and they all were happy to teach and explain when asked upon.

REFERENCES

Statements from employees at Henry of Pelham (*winemakers)

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APPENDIX

Cleaning tanks

1. Spray all lees out with water and use a drain hose to direct the lees to a drain
2. Rinse with a scorpion to wash all tartrate crystals of the tanks. Hit the racking valve and tasting valve with scorpion as well.
3. Make a loop with hoses from bottom valve through a pump to spray ball at the top lid.
4. Put in water + cleanskin, when run the loop with cleanskin for about 10 minutes. If the tank is clean, go on to step 5. If not, use the scorpion to get the last tartrate

Cleanskin - K

A 100% active potassium alkaline detergent powder.

Made for producers who are concerned about the environmental, yet still want the same high effectively cleaning.

‘Clean the loop. Disconnect the hose from the pump to the bottom valve and replace with a drain hose from the bottom valve.

5. Connect a water hose to the empty hole in the pump. Then, at the same time, turn on the pump and the water and run until all cleanskin is out.
(Woody, 2019)

Transfer wine

1. Rinse the pump, hoses and hard lines first. Simply just pour in cleanskin powder in that end of the hose, which is eventually going in the sending tank. Then connect a water hose to the hose where the cleanskin were put in. And once again turn on the water and pump at the same time. The other end if the system is of course not connected to the receiving tank, it will just run in a drain. Run until there is only coming clean water through the system
2. Connect the clean hose to the racking valve on the sending tank. Then turn on the pump once again. Run the pump until only wine comes through (use a T-piece and (see photo)) taste the water/wine)
When only wine comes through, swift to receiving tank on the T-piece, and let it run until the wine level reach the racking valve on the sending tank. The rest of the wine be sucked out simply by putting the hose through the little door in the tank and into the wine (be careful that the hose is not sucking lees)
3. Then no more wine can be transferred without getting any lees, stop the pump.
4. Connect the water hose to the pump to push the rest of wine through the system. Important to turn on the pump and water at the same time.
5. On the T-piece, look for when the wine turns to water. Taste to be sure. A little water in the wine doesn't make a difference on this scale.
(Woody, 2019)

Yeasting

1. Bring xx L of water to 40° C in portable tank
2. Dissolve xx KG of Energy Glu in portable tank
3. Sprinkle xx KG of DV10 Yeast on surface of water and mix
4. Wait 15 minutes
5. Add 8 L Juice, mix and wait 15 minutes
6. Add 16 L Juice, mix and wait 30 minutes
7. Add 32 L Juice, mix and wait 60 minutes
8. Add 32 L Juice every hour for 2 hours
9. After last Juice addition, wait 1 hour
10. Pump Juice from portable tank into tank

Portable tank capacity at least xxx L

(Silverthorne, 2019)