

Grape quality measurements

Aim : Determination of grape quality as provisioning ESS and the influence on soil management strategies on different parameters

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Surveys nb/year	1x per year;												
When?	Before harvest <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px 5px;">J</td> <td style="border: 1px solid black; padding: 2px 5px;">F</td> <td style="border: 1px solid black; padding: 2px 5px;">M</td> <td style="border: 1px solid black; padding: 2px 5px;">A</td> <td style="border: 1px solid black; padding: 2px 5px;">M</td> <td style="border: 1px solid black; padding: 2px 5px;">J</td> <td style="border: 1px solid black; padding: 2px 5px;">J</td> <td style="border: 1px solid black; padding: 2px 5px;">A</td> <td style="border: 1px solid black; padding: 2px 5px; text-align: center;">★</td> <td style="border: 1px solid black; padding: 2px 5px;">O</td> <td style="border: 1px solid black; padding: 2px 5px;">N</td> <td style="border: 1px solid black; padding: 2px 5px;">D</td> </tr> </table>	J	F	M	A	M	J	J	A	★	O	N	D
J	F	M	A	M	J	J	A	★	O	N	D		
Time estimate	collection of samples about 10 minutes per treatment; preparation of juice in the lab and measurements 15-30 minutes per sample												
General context/references	Grape quality parameters are measured with FTIR and yield is estimated by counting a number of bunches and determine the average bunch weight. This allows estimation of yield/ha using plant density. We recommend using FTIR measurements for all groups, if this is not possible have a look at simple methods (II).												

Material:

SPAD Meter Chlorophyll Measurements (Konica Minolta:
<https://www.konicaminolta.eu/en/measuring-instruments/products/colour-measurement/chlorophyll-meter/spad-502plus/introduction.htm>). Additionally labeling of plants and leaves to measure same plants and leaves at different timepoints.

Sampling method:

Collection of 100 berry samples in vineyards in pre-labeled plastic bags; berries should be taken from different position of grape clusters; store collected samples in a cool storage box and use samples on the same day or the day after for analyses; do not freeze sample, as titratable acidity would be influenced; if storage needed (best between 10-15°C over night)

Protocol:

- I. **Protocol if you have access to FTIR analyses (own measurements, or commercial lab)**
 - Determine the weight of 100 berries
 - Smash/squeeze berries manually (e.g. let them in the plastic bag and gently smash them)
 - Fill juice through a sieve into a 50ml tube (e.g. Falcon tubes)
 - Centrifuge samples at maximal speed for 10 min at 15°C
 - Afterwards filtrate juice through a fluted filter into a new tube by not disturbing the pellet
 - Keep fresh juice cooled at 15°C
 - analyze with FTIR machines (about 50ml are needed, or what the commercial lab recommends)
 - values you get are: soluble solids, titratable acid pH, malic acid, tartaric acid, density, sometimes glucose, fructose, NOPA, ammonium
 - we commend to determine titratable acidity also manual, as FTIR data are not always reliable with this parameter

- II. **Simple measurements, if you do NOT have access to FTIR analyses**

- Same sample preparations as above mentioned
- **Soluble solids:** measure juice with a standard refractometer (e.g. from Atago)
- **Density:** measure juice with a flexural resonator (e.g. portable density meter from company Anton Paar)
 - 3 ml of sample needed for one measurement
 - First clean the tube with 3x water measurement
 - Suck up the sample and press the save symbol at the back of the instrument, note the result
 - Measure each sample in triplicates (3x 3ml)
 - Purge the tube with water between individual measurements
- **Titrateable acidity:**
 - a. you can use an automatic titrator (several suppliers),
 - b. or a standard Rebelein trtration (e.g. from <http://www.c-schliessmann.de/>),
 - c. or titration by hand with an indicator (e.g. "Blaulauge" blue alkali solution; protocol e.g. http://www.winegrowers.info/wine_making/Merkel_acidity.htm)

Method with automatic titrator:

- use 0.204N NaOH; measurement conducted 1x; select or determine a titration program (depends on the titrator you have)
 - fast titration is ok, saves time
 - Use a thin and high beaker and put a small fitting magnetic stir into it
 - Put 10 mL (pipette) of grape juice in the beaker
 - Add pH cuvette
 - Press start
 - The end point is reached at pH 7
 - Write down the volume of sodium hydroxide used:
The volume of sodium hydroxide (NaOH 0,204N) in ml allows to know directly the total acidity in g/l of sulphuric acid (1 ml of sodium hydroxide to 0,204N= 1g/l of sulphuric acid). If you use NaOH to 0,1N, $n \times 0,49 = \text{g/l of H}_2\text{SO}_4$ (n=ml of sodium hydroxide used).
 - For calculation mg/l tartaric acid:
sulfuric acid * 1.53 = approximately tartaric acid
- **pH value:** separate instrument or with titrator before the start of the measurement
 - Wash the electrode with water
 - Put the electrode into the sample and take care that the tip of the electrode is completely covered with sample.
 - Wait shortly and note the value

Data collected:

Data have to be collected in a data sheet that reminds the name of the experimental site, the date, the treatment in which the survey is done. The data sheet is provided in the Dropbox in an excel file “grape quality data”.xls.