Kwizda Xperience

# FAQ

# KX Vine EN

# General

## *How can I start the KX Vine?*

You can access KX Vine via the following link.

Or by scanning the following qr-code:

## *How can I save KX Vine on my mobile phone?*

You can save the KX Vine website on the home screen of your mobile phone. This means you always have KX Vine to hand when you need it.

**Android**

1. Open a browser app such as Google Chrome.
2. Navigate to the website you want to save on the home screen.
3. Tap on the three dots at the top right
4. Select the option *Add to home screen*.
5. Tap on *Add* so that the icon for the website is automatically placed in a free position on the home screen or hold your finger on the icon to select a position yourself.
6. Done, the shortcut to the website is now arranged in the same way as your installed apps on the home screen.

**iOS**

1. Open the Safari browser.
2. Navigate to the desired website.
3. Press the *Share button*, the small square with the arrow pointing upwards.
4. Expand the menu.
5. Here you will find the option *To home screen*.
6. Select a free position on the home screen.

## *How can I search for a location?*

To search for a specific location, simply use the search bar at the top left. Enter the desired location or zip code here and confirm the search with Enter.

If the search is not successful, you can refine it by entering a country code in addition to the location or zip code. The following country codes can be used:

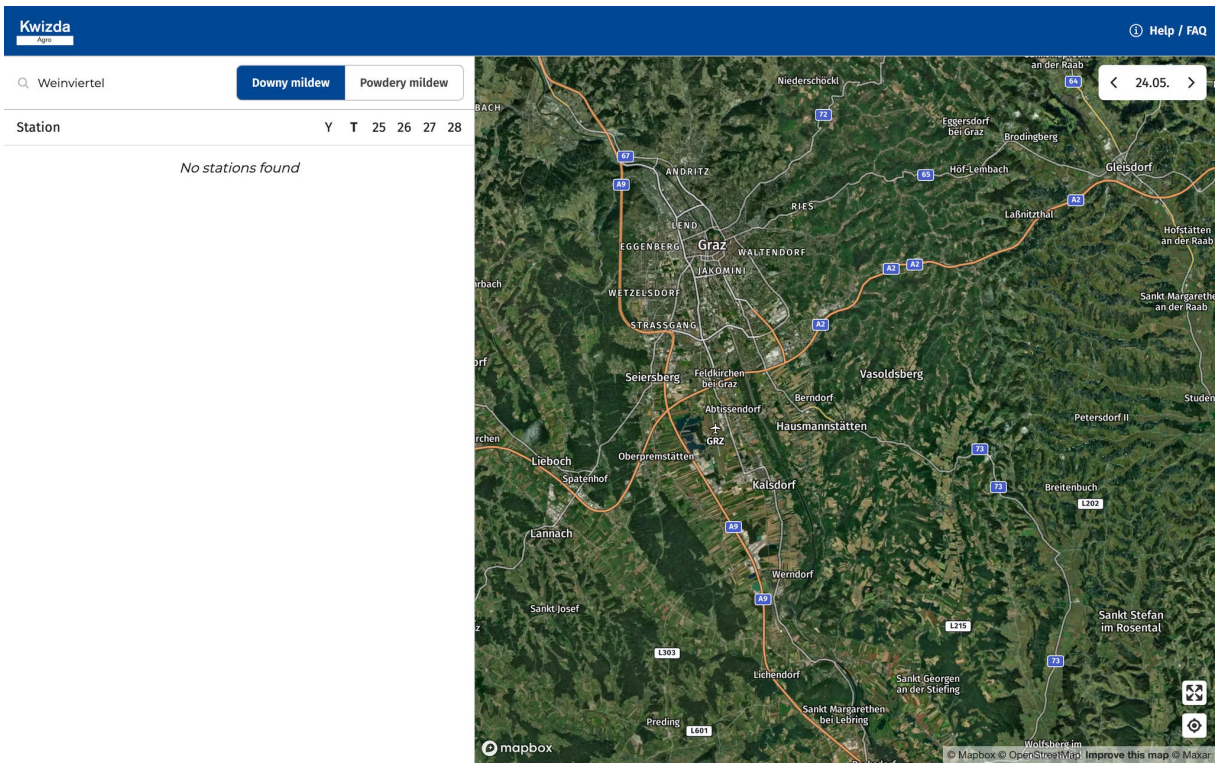
- AT - Austria
- HU - Hungary
- RO - Romania
- DE - Germany

You can find all other country codes here:

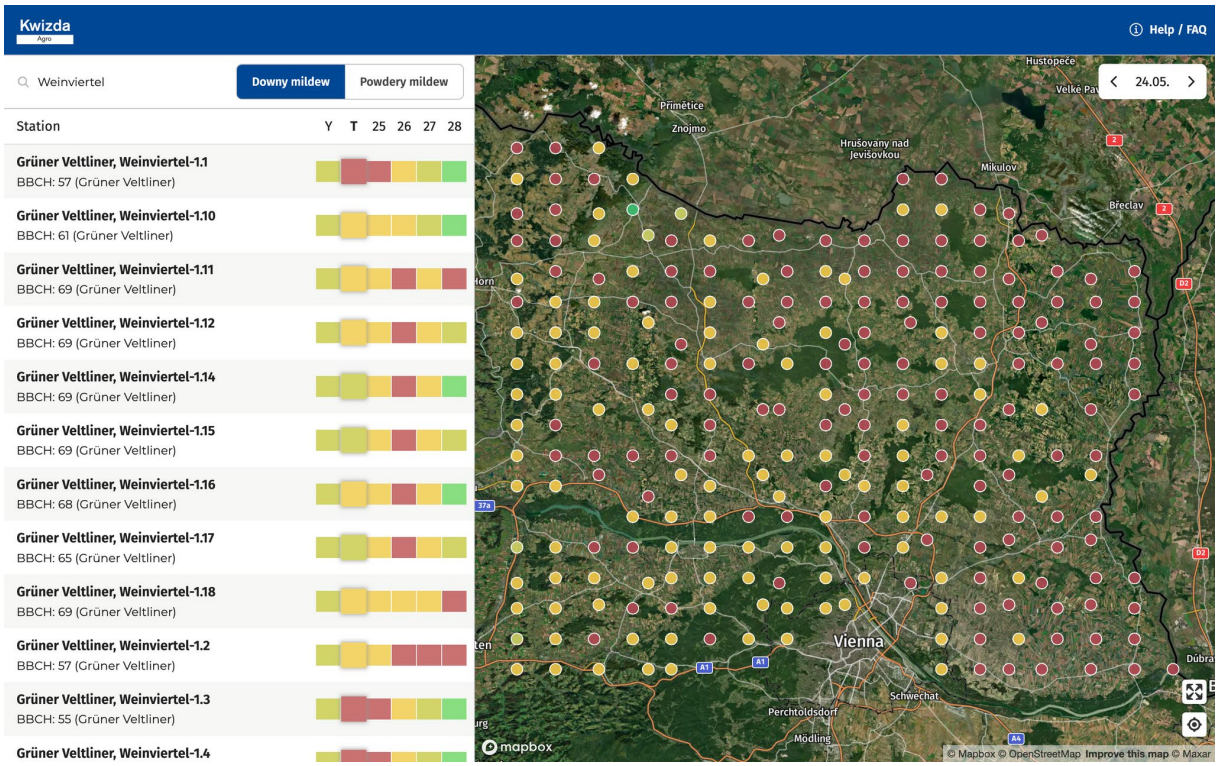
List of country codes by alpha-2, alpha-3 code (ISO 3166)

### *How can I search for a virtual station?*

To search for a specific station, use the search bar at the top left. Please note that initially only those stations are displayed that are located within the map section on the right. If there are no hits for the corresponding search term within the map section, the app initially displays “No stations found”.



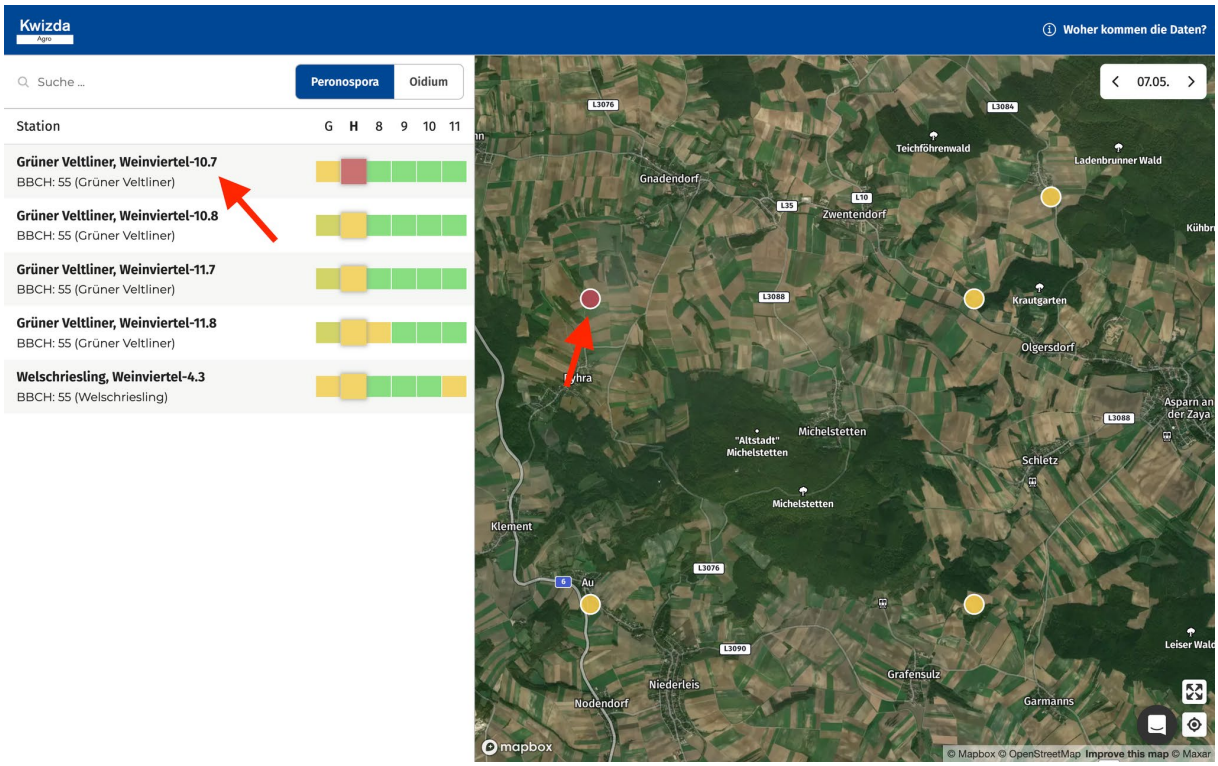

However, if you now confirm the search with **Enter**, KX Vine compares the search query with all the virtual stations created in the system and automatically moves the map section to the appropriate region.




After pressing the “Enter” button, KX Vine also checks the locations outside the map section and displays all stations in the entire system that match the search criterion.

## *How can I select a virtual station?*

To select a virtual station, either click on the name in the list view or on the desired point on the map.




# Weather

## *Why don't you need weather stations for the system?*

The most important information in advance: A weather station does not calculate a weather forecast. Weather forecasts are calculated by weather models running on supercomputers.

KX Vine uses a service from VineForecast, which accesses data from various weather models for weather forecasts and adapts these models to the local conditions of a location. In this way, the effect of the general weather situation on the microclimate of a vineyard is estimated even more precisely.

## *How are the weather forecasts calculated?*

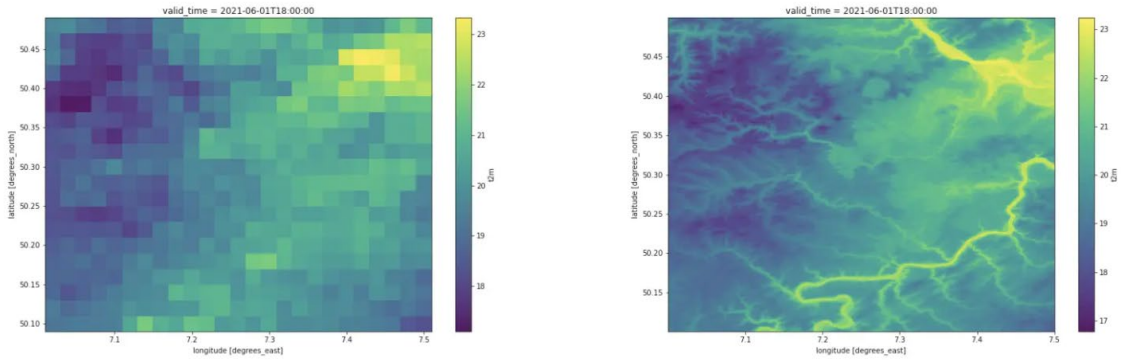
Weather forecasts are calculated by weather models that use the laws of physics to predict the development of the weather. This method is also known as numerical weather forecasting. As this requires huge amounts of computing capacity, weather forecasts are mainly calculated by weather services such as the German Weather Service (DWD) in Offenbach or the National Oceanic and Atmospheric Administration (NOAA) in the USA.

Measurement data from weather balloons, satellites, and weather stations continuously inform these weather models about the current state of the atmosphere. Measurement data must come not only from one region but also from all over the world and from different layers of the atmosphere.

As a basis, VineForecast obtains weather models from the German Weather Service (e.g. temperature, precipitation, humidity, etc.). Ideally, however, this data only has a resolution of 1-2 km. If this raw data were fed into a disease model, the accuracy would be very low. To increase the accuracy, VineForecast uses a method from climate physics.

Downscaling (https://www.vineforecast.com/downscaling-regionalisieren-von-wetterdaten/), also known as regionalization, makes it possible to include regional influencing factors in the weather forecast. Among other things, the local topography with a resolution of 50 meters is used to adjust weather data. This allows, for example, the effects of different altitudes or slope inclinations to be included.

The effect is illustrated by the following example of temperature adjustment. The image shows a map section of the Moselle (Germany) with a scale of 50x50 km. The left image shows the DWD's standard model for temperature with a resolution of 2x2 km. The right image shows the optimized model from VineForecast with a resolution of 50x50 m.




You can find out more about numerical weather forecasts on the website of the German Weather Service:
https://www.dwd.de/EN/research/weatherforecasting/num_modelling/num_modelling_node.html;jsessionid=77E962CCDAD1047DE6789F71DFF5D41D.live21064

### *Where does the precipitation data come from?*

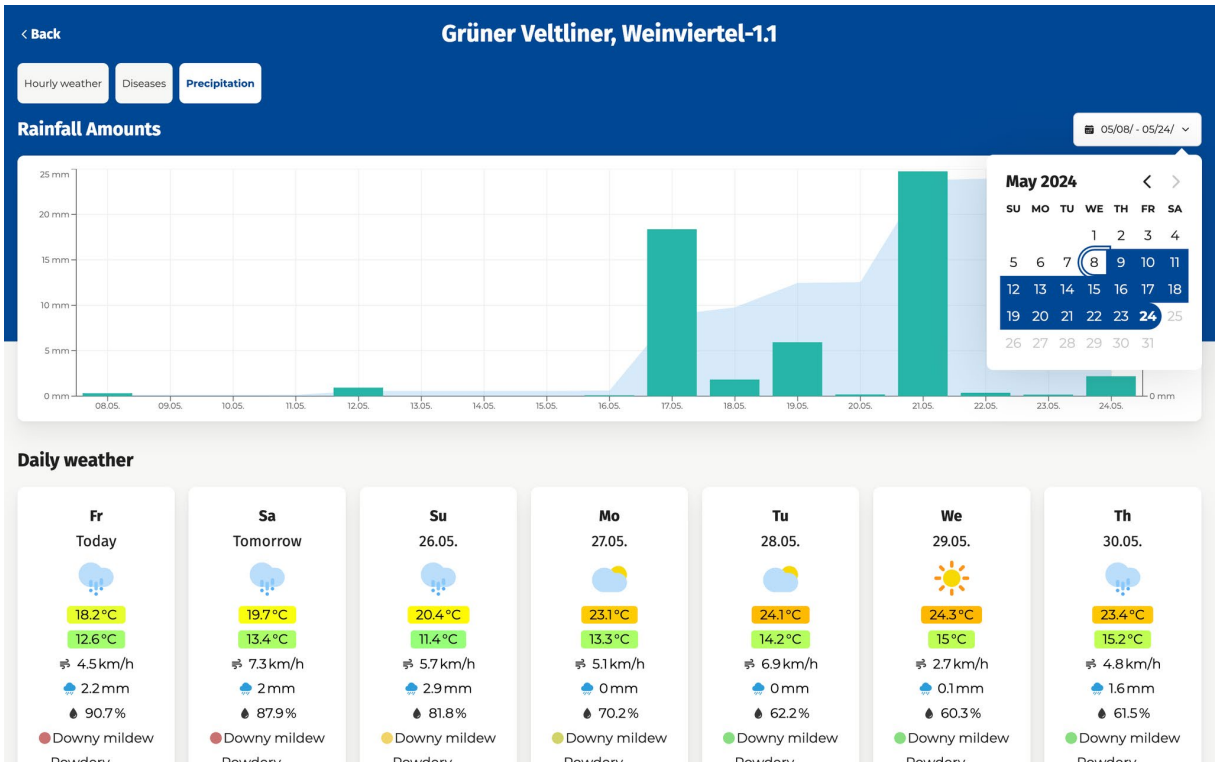
Precipitation data is used for forecasting by weather models. Historically, V4C can further improve the statements on the amount of precipitation in some regions by using radar data from rain radars as an additional data source.

### *How long is the forecast horizon for the hourly and daily weather?*

- Hourly forecast: 48 hours
- Daily forecast: 7 days

### *Can I change the period of the precipitation history?*

After you have clicked on a station, you can display the precipitation history by clicking on “Precipitation” in the top left-hand corner. The desired time period can then be displayed by selecting the date in the top right-hand corner.




## *When is which symbol displayed in the spray weather?*

The spray weather is displayed in both the hourly and daily weather. In the daily weather, the symbol that is most frequently present in the hourly weather on that day is displayed.

### Optimal conditions

- Green checkmark (“optimal spraying weather”)
    - Is displayed if the weather has no significant influence on crop protection.

### Sufficient conditions

- Green drop (“low humidity”)
    - The air humidity is low (below 45%). This can have a negative effect on the crop protection product applied, e.g. through volatilization.
- Green thermometer (“low temperature”)
    - The temperature is relatively low (below 12°C). This can have a negative effect on some crop protection products (e.g. slow uptake by the plant).
- Yellow leaf (“leaf wetness present”)
    - It can be assumed that the leaves are partially wet at this time. Under certain circumstances, this can lead to increased dripping of the crop protection product.
- Yellow wind symbol (“increased wind speeds”)
    - The wind speed is over 3 m/s (10.8 km/h). This can lead to increased drift.
- Yellow rain cloud (“precipitation”)
    - Precipitation can cause the crop protection product to be washed off.
    -

**Inadequate conditions**

- Red Cross ("Insufficient spraying conditions")
    - The conditions for spraying are **insufficient** at this time. The temperatures are higher than 25°C and/or the wind speed is higher than 5m/s and/or the relative humidity is lower than 30%."

### *How is leaf wetness calculated?*

Leaf wetness or leaf wetness duration is derived from relative humidity, as there is a strong correlation between these two variables (see e.g. research by Sentelhas et al., 2008).

**References**


- Sentelhas, P. C., Dalla Marta, A., Orlandini, S., Santos, E. A., Gillespie, T. J., & Gleason, M. L. (2008). Suitability of relative humidity as an estimator of leaf wetness duration. *Agricultural and forest meteorology*, *148*(3), 392-400.


### *How often is the weather data updated?*

Four times per day.

## Disease forecasts

### *How are the forecasts for Powdery Mildew calculated?*

The disease forecasts are based on the latest viticultural research. The models from viticulture research are in turn based on weather data such as humidity, temperature or precipitation.

For powdery mildew, VineForecast is guided by the OiDiag Index according to W. K. Kast, among others, and make specific adjustments based on further research and experience.

**References**


- Kast, W. K., & Bleyer, K. (2011). The expert system OiDiag-2.2–a useful tool for the precise scheduling of sprays against powdery mildew of vine (Erysiphe necator Schwein.). *IOBC/WPRS Bull*, *67*, 79-84.


### *How are the forecasts for Downy Mildew calculated?*

The disease forecasts are based on the latest viticultural research. The models from viticulture research are in turn based on weather data such as humidity, temperature or precipitation. VineForecast calculates this weather data itself, as explained here.

For the Downy Mildew forecast, different models depending on the phase are used. Oospore germination and primary infection are calculated similarly to the model of Rossi et al. (2007). Secondary infections are calculated using the leaf wetness hours (Bläser & Weltzien, 1979). The risk index is calculated from the sum of temperatures during hours of leaf wetness (for each day). If

the value is above 75, there is a slight risk of infection. If the leaf wetness hour is higher than 200, a high risk of infection can be assumed.

**References**


- Blaeser, M., & Weltzien, H. C. (1979). Epidemiologische Studien an Plasmopara viticola zur Verbesserung der Spritzterminbestimmung/Epidemiological studies to improve the control of grapevine downy mildew (Plasmopara viticola). *Zeitschrift für Pflanzenkrankheiten und Pflanzenschutz/Journal of Plant Diseases and Protection*, 489-498.
- Rossi, V., Caffi, T., Giosue, S., & Bugiani, R. (2008). A mechanistic model simulating primary infections of downy mildew in grapevine. *Ecological modelling*, *212*(3-4), 480-491.


## *How should the disease forecasts be interpreted?*

The infection forecasts indicate how high the risk of new infections is on a given day. They therefore do not describe the current condition of the vine or whether visual symptoms of a disease are visible. The infection forecasts therefore describe the potential for the vines to become infected with a disease for the first time or the risk of an existing disease spreading further and infecting healthy plant material.

## *What do the colors of the infection forecasts mean?*

KX Vine communicates disease risks as simply and purposefully as possible. The risk display is shown in the form of a traffic light system:

No infections risk

Low infections risk

Nedium infections risk

High infections risk

## *How is the leaf area and the growth of the vines calculated?*

The disease forecasts are based on the latest viticultural research. The leaf area and growth of the vine is calculated using temperature totals. Daily mean temperatures (usually starting on January 1st) are added up. Certain values of the temperature sum can then be assigned to stages of the vine's development. For example, based on the research of Prof. Schultz from Hochschule Geisenheim University.

**References**

- Schultz, H. R. (1992). An empirical model for the simulation of leaf appearance and leaf area development of primary shoots of several grapevine (Vitis vinifera L.) canopy-systems. *Scientia Horticulturae*, *52*(3), 179-200.

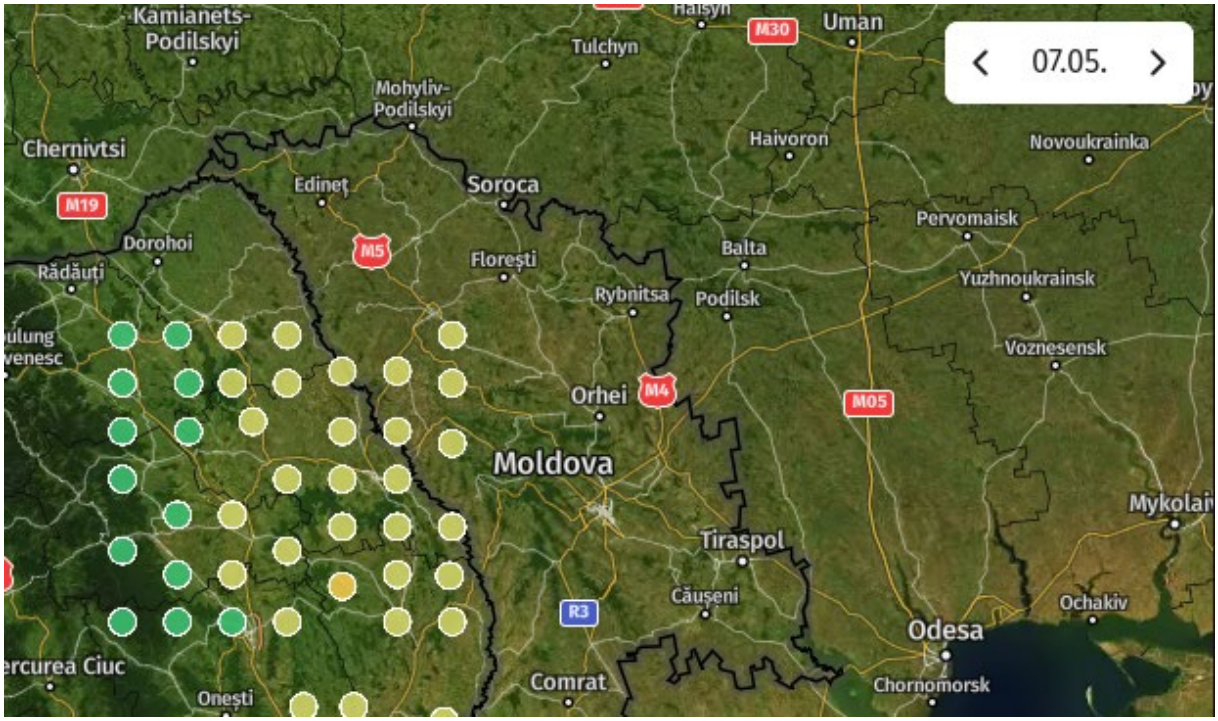

### *How are the protection parameters to be interpreted?*

To assess the effectiveness of a recently applied plant protection product, it is advisable to look at the **new growth** and the **precipitation** since the last plant protection measure. As a rule, it can be assumed that contact agents provide insufficient protection against new infections from a new growth of approx. 400 cm², while systemic agents can protect the vine up to a new growth of 600-700 cm².

In the case of contact agents, the precipitation since the last spraying must also be taken into account. The threshold values above which wash-off effects are to be expected vary from product to product. With most contact agents, it can be assumed that the plant is no longer sufficiently protected against new infections after 20 - 40 mm of precipitation. Precipitation with a high intensity (a lot of precipitation in a short time, e.g. thunderstorms) can lead to increased wash-off in contrast to precipitation with a low intensity (e.g. long-lasting drizzle).

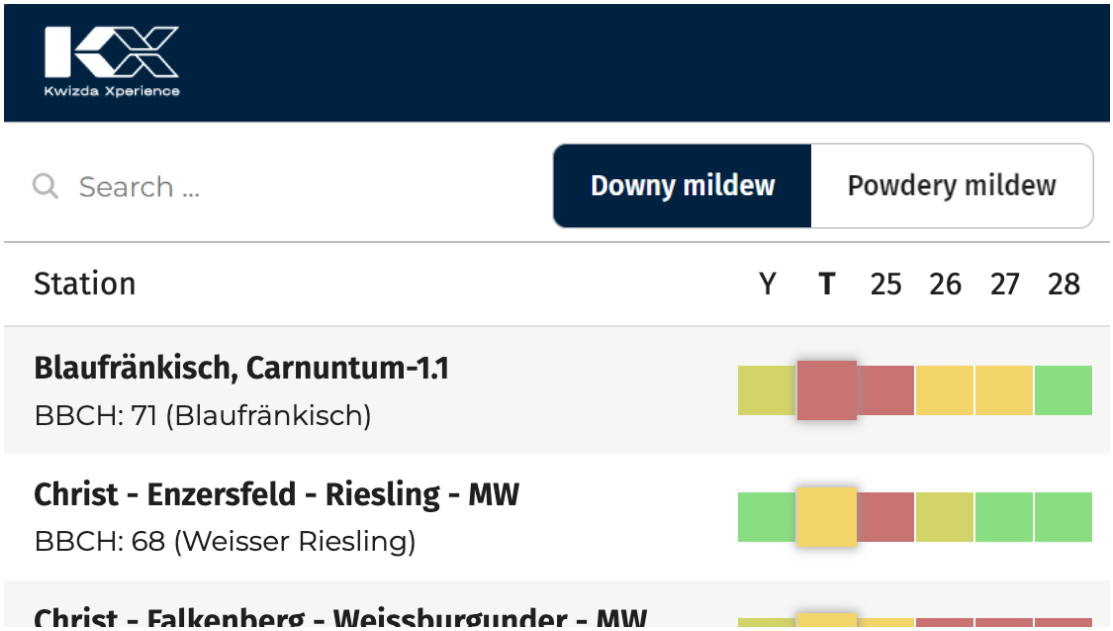
### *Which day of the infection forecast is displayed on the map and how can I change the displayed day?*

The date for which the current infection forecast is shown on the map is displayed at the top right of the map. You can also change the date there using the arrows.




### *For which disease is the infection prognosis displayed on the start page?*

A distinction can be made in the display between Powdery Mildew and Downy Mildew. Above the station list, you will find the button that can be used to select the respective illness for which the forecast is to be displayed for the previous, current and next four days.




***How are the forecasts for the BBCH stage calculated?***

The BBCH model is based on the study by Molitor et al. (2020). In this model, the BBCH stages 1 - 89 are calculated based on temperature sums formed from bud burst (BBCH 9). To use the model in practice, the BBCH model must be linked with a bud burst model. This system relies on the study by Leoloni et al. (2020). As long as the bud burst model does not calculate a bud burst, no calculations are performed by the BBCH model. In other words, the bud burst model calibrates the BBCH model.
The BBCH model differentiates between 12 different grape varieties in the calculation of BBCH stages. In KX-Vine, the remaining grape varieties are each assigned to the grape variety from the study by Molitor et al. (2020) that is phenologically most similar to them.
The BBCH stages 1-7 are also calculated by the BBCH model. For this, the calculation from BBCH 9 from the bud burst model is used. The temperature sums are formed relative to BBCH 9 and are thus negative for BBCH 1 - 7. The following table from the Molitor study illustrates this.

| BBCH stage | Riesling | Rivaner | Elbling | Gewürz-traminer | Pinot blanc | Auxerrois | Sauvignon blanc | Pinot gris | Chardonnay | Merlot | Pinot noir |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 01 | -43 | -45 | -45 | -44 | -42 | -43 | -40 | -41 | -45 | -44 | -45 |
| 03 | -31 | -34 | -35 | -34 | -33 | -33 | -31 | -32 | -39 | -33 | -35 |
| 05 | -24 | -28 | -28 | -26 | -25 | -23 | -20 | -25 | -31 | -23 | -26 |
| 07 | -13 | -15 | -19 | -18 | -14 | -14 | -13 | -13 | -23 | -13 | -16 |
| 09 | 0 | -5 | -11 | -9 | -7 | -1 | -3 | -1 | -16 | 0 | -6 |
| 11 | 7 | 6 | -2 | 2 | 2 | 5 | 6 | 6 | -8 | 7 | 5 |
| 12 | 15 | 12 | 2 | 10 | 11 | 12 | 10 | 13 | 3 | 13 | 10 |
| 13 | 22 | 18 | 9 | 19 | 20 | 18 | 17 | 18 | 8 | 19 | 16 |
| 14 | 37 | 27 | 17 | 25 | 30 | 29 | 35 | 32 | 17 | 28 | 26 |
| 15 | 47 | 44 | 26 | 42 | 45 | 44 | 46 | 49 | 31 | 46 | 42 |
| 16 | 60 | 61 | 41 | 54 | 61 | 60 | 59 | 60 | 47 | 59 | 55 |
| 17 | 77 | 74 | 54 | 68 | 78 | 73 | 85 | 77 | 57 | 75 | 71 |
| 18 | 90 | 86 | 64 | 79 | 88 | 87 | 98 | 90 | 69 | 90 | 80 |
| 19 | 109 | 102 | 77 | 92 | 106 | 106 | 116 | 116 | 86 | 106 | 100 |
| 53 | 55 | 57 | 47 | 54 | 51 | 51 | 56 | 54 | 41 | 50 | 49 |
| 55 | 82 | 71 | 69 | 92 | 80 | 78 | 81 | 79 | 67 | 80 | 71 |
| 57 | 159 | 150 | 147 | 158 | 157 | 161 | 168 | 163 | 129 | 168 | 151 |
| 61 | 222 | 214 | 216 | 221 | 215 | 217 | 231 | 213 | 180 | 218 | 202 |
| 63 | 233 | 226 | 228 | 231 | 226 | 232 | 247 | 223 | 195 | 229 | 218 |
| 65 | 243 | 236 | 239 | 239 | 235 | 247 | 262 | 234 | 208 | 240 | 229 |
| 68 | 261 | 250 | 255 | 258 | 251 | 263 | 273 | 252 | 227 | 257 | 241 |
| 69 | 269 | 260 | 265 | 266 | 265 | 274 | 286 | 264 | 236 | 270 | 250 |
| 71 | 284 | 272 | 278 | 284 | 281 | 293 | 302 | 280 | 251 | 289 | 266 |
| 73 | 316 | 306 | 315 | 325 | 297 | 325 | 338 | 308 | 287 | 323 | 301 |
| 75 | 407 | 391 | 398 | 422 | 402 | 412 | 431 | 401 | 376 | 375 | 385 |
| 77 | 461 | 489 | 433 | 471 | 439 | 453 | 478 | 434 | 424 | 522 | 513 |
| 79 | 538 | 608 | 497 | 537 | 513 | 545 | 570 | 503 | 526 | 670 | 627 |
| 81 | 777 | 653 | 760 | 740 | 752 | 752 | 764 | 730 | 746 | 784 | 731 |
| 83 | 798 | 687 | 782 | 766 | 781 | 773 | 788 | 766 | 769 | 800 | 763 |
| 85 | 820 | 719 | 801 | 792 | 804 | 792 | 808 | 792 | 788 | 834 | 788 |
| 89 | 997 | 948 | 1009 | 948 | 986 | 976 | 966 | 979 | 976 | 997 | 940 |

**Fig. 2.** Heat map of the average $CDD_{10,20,30}$ values relative to BBCH 09 in Riesling until the respective BBCH stage was reached in the 11 cultivars of investigation. In each BBCH stage, the cultivar with the lowest $CDD_{10,20,30}$ value (=earliest development) is depicted in green and the cultivar with the highest $CDD_{10,20,30}$ value (=latest development) in red. Intermediate values are presented in graduated colours between green and red. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

References:

Leolini, L., Costafreda-Aumedes, S., A. Santos, J., Menz, C., Fraga, H., Molitor, D., ... & Moriondo, M. (2020). Phenological model intercomparison for estimating grapevine budbreak date (Vitis vinifera L.) in Europe. Applied Sciences, 10(11), 3800.

Molitor, D., Fraga, H., & Junk, J. (2020). UniPhen–a unified high resolution model approach to simulate the phenological development of a broad range of grape cultivars as well as a potential new bioclimatic indicator. Agricultural and Forest Meteorology, 291, 108024.