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Apex-Vigne: A mobile application to facilitate the monitoring of growth and estimate the water status of the viticulture plots

>>> The observation of apex growth is a simple method that was introduced to monitor the existence of water restriction in the vineyard[1, 2]. Based on the direct observation in each plot, it represents a particularly interesting approach for the wine sector because it is easy to implement and inexpensive[3]. However, despite its advantages, the method of apex has its own implementation limits that hinder its acceptance and broader use amongst winegrowing professionals. One of its principle limitations is the need to note and memorize the apex counts plot by plot as well as the need to undertake a calculation of the indexes from these counts[4]. The objective of the Apex-Vigne application is to propose a free tool that will eliminate these constraints and thus favor the adoption and use of the apex method. <<<

■ Application features, free and simple to use

The Apex-Vigne application is an « advanced calculator » that facilitates the field implementation of the apex method for professionals (winegrowers, consultants and other players of sector) The application is free and available under Android. (https://play.google.com/store/apps/details?id=ag.GB.apex&hl=fr).
It should soon also be under iOS. It presents an environment that consolidates several features that allow you to:

➔ Facilitate the count of the 50 apexes with a visual aid in order to assign the observation to one of the 3 growth classifications and a meter permitting the monitoring of the advancement of the count (cf. figure 1 a).
➔ Automatically calculate the synthesis indicator of the observations (iC-Apex) and interpret the corresponding water restriction under the form of classes (cf. figure 1 b).
➔ Locate, date and register the values of iC-Apex.
➔ Visualize the historical data observations collected on a plot.
➔ Export the data under a compatible format with regular spreadsheets.

Thanks to its features, Apex-Vigne eliminates all paper notation, all plot-based calculation constraints and all data re-entry (with associated error risks). The application also permits access to the plot-tracking historical data wherever one is, and also to easily share the observations with other people.

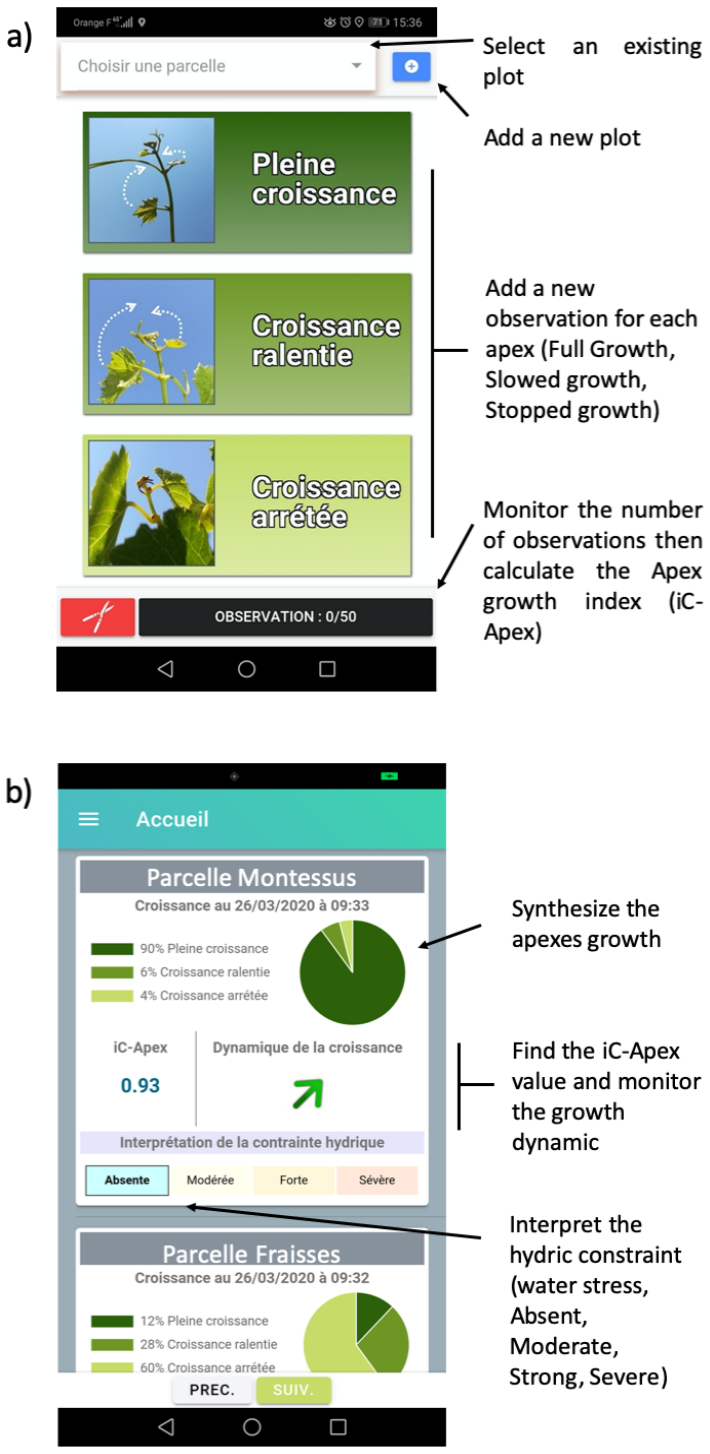

Figure 1. Screen shots of the two principle interfaces of the « Apex-Vigne » application: input screen (a) and overview screen (b).

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Figure 2. The operator undertakes the apex observations with the help of the Apex-Vigne application.

■ Implementation of the apex method

The principle of the method consists of observing the apex of at least 50 shoots on 10 different vine plants.
The vine plants are expertly selected by the operator within the zone to be characterized. (plot, within field zone or field) depending on their objectives and on their operational constraints. The method suggests to observe the 5-highest growth apexes on each of the 10 vine plants selected[5]. For a pertinent temporal monitoring, it is advised to observe the same vine plants throughout the season. The method consists of classifying each apex in one of 3 categories: apex in full growth, in slowed-growth or in stopped-growth (figure 2). A growth index (iC-Apex) that is between 0 and 1 is then calculated from the proportion of each class. A value of 1 of the iC-Apex corresponds to 100% of the shoots in full growth and a value of 0 indicates that all shoots have stopped their growth. All values between 0 and 1 represent a scale between full growth and complete stoppage of growth. The interpretation of the associated water constraint establishes the hypothesis that the availability of water in the soil is the principle factor limiting the vegetative growth of the vines.

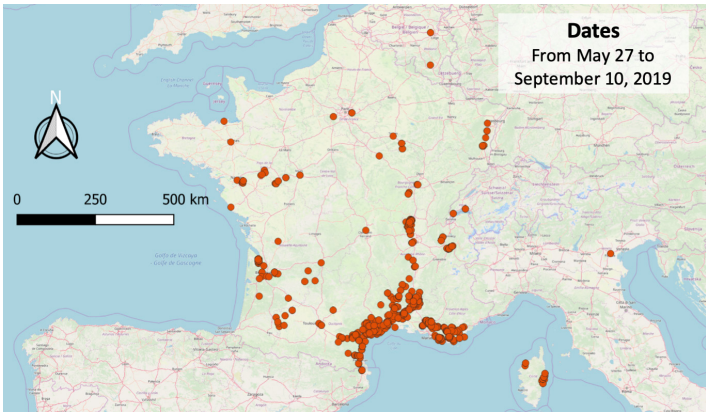

Figure 3. Location of the observation sessions effectuated in France with the help of the « Apex-Vigne » mobile application during the weeks 22 to 36 of the 2019 season.

In this case, it was demonstrated that the apex count permitted the calculation of the indicators that were correlated to the water status of the vines[2].
Although much less precise that other approaches of reference, the apex method has the advantage of being easily effectuated without any special skill and without costly equipment.

■ A few specific aspects of the project

The development of the application is the result of a close collaboration between the Institut Agro (Montpellier SupAgro) and the IFV within the framework of a project financed by the Occitanie region. This development lasted for 2 years. The current interface is the result of an iterative process (we speak of agile development methods) based on the results of a group of 20 users in the field. The application was launched in June 2019. Over 6000 observation sessions were carried out with the "Apex-Vigne" application, as of the first season, in the majority of winegrowing regions in France (Languedoc, Bordeaux, Rhone Valley, Provence, Loire Valley, Champagne, Burgundy, Alsace). The distribution (figure 3) and number of observation sessions illustrate the interest in this application by the wine sector, especially in the south where the water restriction is the predominant limiting factor that determines growth stoppage. ■

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1 Rodriguez Lovelle B., Trambouze W., Jacquet O., 2009. Évaluation de l'état de croissance végétative de la vigne par la méthode des apex. *Progrès Agric. Vitic.*, 126, 77 - 88.
2 De Toda, F. M., Balda, P., Oliveira, M., 2010. Estimation of vineyard water status (*Vitis vinifera L.* cv. Tempranillo) from the developmental stage of the shoot tips. *OENO One*, 44(4), 201-206.
3 Saurin, N., Tisseyre, B., Lebon, E., 2014. Comment mesurer la contrainte hydrique de la vigne, de la plante au vignoble. *Innovations Agronomiques* (38), 143-158.
4 Brunel, G., Pichon, L., Taylor, J., & Tisseyre, B., 2019. Easy water stress detection system for vineyard irrigation management. In Precision agriculture'19, *Wageningen Academic Publishers*, 112-120.
5 IFV, 2020. https://www.vignevin-occitanie.com/fiches-pratiques/methode-des-apex/