Dacom Phytophthora advice going mobile

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SUMMARY

In 1996, an advisory module for accurate *P. infestans*, control was developed by Dacom. Over the years, this model has been intensively tested by researchers and used by farmers around the world. The advice is calculated and presented on the PC of the farmer. To be able to advice growers without a PC, a warning system by phone based on the Dacom model was introduced in the Netherlands and operated for 11 years until 2012. But the world of communication is changing rapidly. The development of smartphones and the use of social media has an impact on the use of smartphones by farmers. Instant information at any place right on the smartphone or tablet is now demanded. In order not to compromise on quality, Dacom has completely re-build her *P. infestans* advice to present it on iOS and Android platforms.

KEYWORDS

P. infestans, models, Dacom, advice, mobile platforms

INTRODUCTION

In the early 90's, Dacom developed her model for the management of *P. infestans*. In that same period, there was great concern by the potato industry and the Dutch government about the extensive usage of fungicides. The potato sector joined forces to reduce the dependency of fungicides. As a part of the chosen strategy, Decision Support Systems, the so-called DSS's, were promoted. Also, a general advice system that alerted potato growers by telephone was initiated. This system was powered by the Dacom model and used for 11 years. In the meantime, applying a fungicide only when needed, was becoming commonly accepted in the Netherlands.

Dacom BV is a Dutch company founded in 1987 and provides farmers with advice systems to optimize crop yield based on ICT and sensor technology. For processors, Dacom makes field information transparent for traceability. Also, yield can be forecasted and afterwards benchmarking of the carbon footprint and the water footprint can be done.

MOTIVATION

With the fast changes in society with the social media and the quick acceptance of smartphones, Dacom decided to make her DSS modules accessible for a broader market by going mobile with her fungus advice. At the same time, farmers are more in need of instant information regarding the situation on the farm and want to focus their attention on possible problem spots.

DATA COLLECTION

In order to operate the model, data from different sources is needed. The weather data is measured by automatic weather stations that are located near the potato field. In order to predict an infection event, the weather forecast is also included in the data set. The weather parameters needed for the calculation are: air temperature (1.50 m), air humidity (1.50 m), rain fall, wind speed, and solar radiation. An option is to include the wind direction. All this data is collected automatically at the Dacom databank and processed into hourly data. Each potato field has a unique weather station assigned (Figure 1).

Figure 1

The farmer will create a potato field in the system. He will record the potato variety, the planting date and the date of emerge. During the growing season he will record at a regular interval crop conditions as crop status, crop growing speed and crop density. Furthermore, the farmer will record the fungicides including the time and the amount he used on the potato crop.

The farmer or agronomical advisor can report possible infection in fields nearby the farmer field in the Dacom system.

THE MODEL

As the model has been described in earlier editions, this description will be just a summary.

The model consists of two main modules: crop coverage by fungicide calculation and development of the *P. infestans* and displayed in the top part of the graph (Figure 2 - top part).

Based on the available information, the (un)protected status of the crop is calculated based on the wear off and the half time value of the fungicide used (including dosage). The other factor is the production of new leaves. Again, depending on the product used, new, unprotected leaves

will be formed. Based on the combination of these two factors, the unprotected status of the crop is calculated through time from the last spraying.

The calculation of the development of the fungus starts with the calculation of the number of spores on a virtual lesion. If spores are calculated, these spores will be ejected and distributed under certain conditions. Depending on the information from neighboring fields, the number of spores attacking the field are calculated. Next, the moment of penetration into a leaf of the spore is calculated based on the presence of free water, the temperature and the variety (Figure 2 - bottom part).
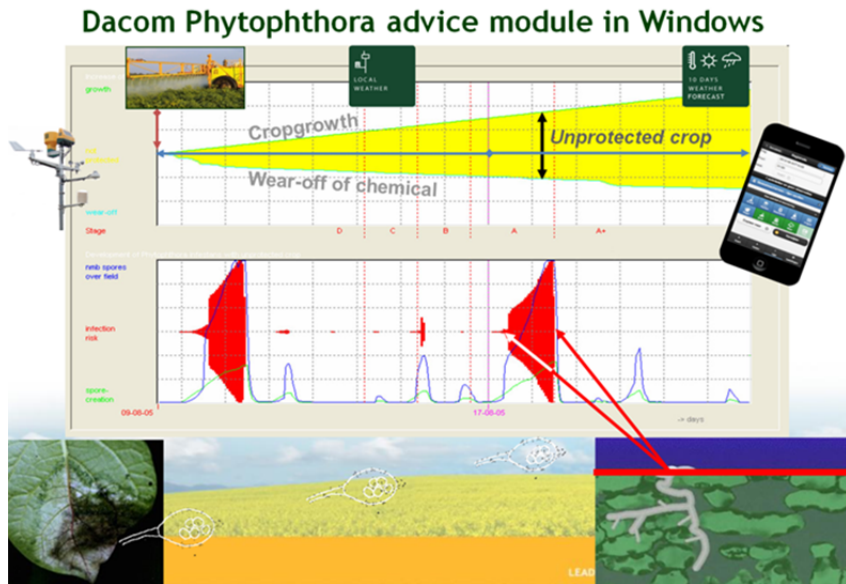

Figure 2

The combination of the unprotected leaf area and the severity of the infection event (duration and number of spores) an advice to spray is calculated. Either for the coming days with a contact fungicide. Or, if an event is missed, with a systemic fungicide.

FIELD DATA

Recording new information can be done either in the traditional Dacom system on the farmer PC or through the Crop-R geo crop recording platform on a web browser or on an app on the smartphone or tablet.

DACOM YIELD MANAGER

The *P. infestans* app is part of a broader suite of applications for the cell phone under the "Dacom Yield Manager" heading. The app can be downloaded for the iOS operating system or

the Android system from the respective web stores. For the first time usage, the app has to be initiated by a username and password.

In the background at the Dacom databank a farmer can indicate that he wants to view the blight situation on his smartphone. All the potato fields of this farmer belonging to the current crop year will be processed. Each hour, the latest available information will be used to calculate the current status of the field regarding the danger for an infection of P. infestans. The fields will be ordered where the field most in need of a fungus application will be on top of the list. On request, the information is sent to the farmer's smartphone (Figure 3).
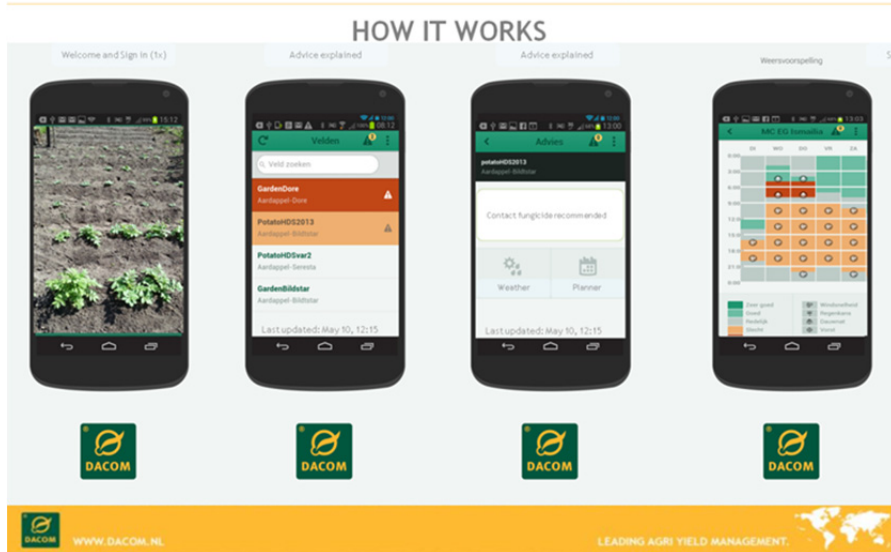

Figure 3

When the farmer wants information about the status of his field, he simply presses the "Dacom Yield Manager" button on his smartphone. Within about 6 to 8 seconds the information of his fields will appear on the screen. The fields are color codes: "red" means "an application is recommended", "orange" means "an application should be considered" and "white" will generate the advice that "no application is needed". The color "blue" means that "there is not sufficient information of this potato field to generate an advice". By touching a field, a further screen with spraying information will appear. On this screen, it is also possible to have an overview of the spraying condition in the coming 10 days and also the weather forecast over this period.

DACOM BLIGHT APP

For 11 seasons, Dacom has warned farmers through a telephone messaging system about the occurrence of *P. infestans* near a farm location in order of the Dutch Potato Organization. This project ended because of the end of the Masterplan it was part of. Dacom decided to make a

general *P. infestans* app. This app can be downloaded for free and works on the available weather data near the location where the user is at that moment. It will calculate the infection risk of *P. infestans* for yesterday, today and tomorrow (Figure 4).
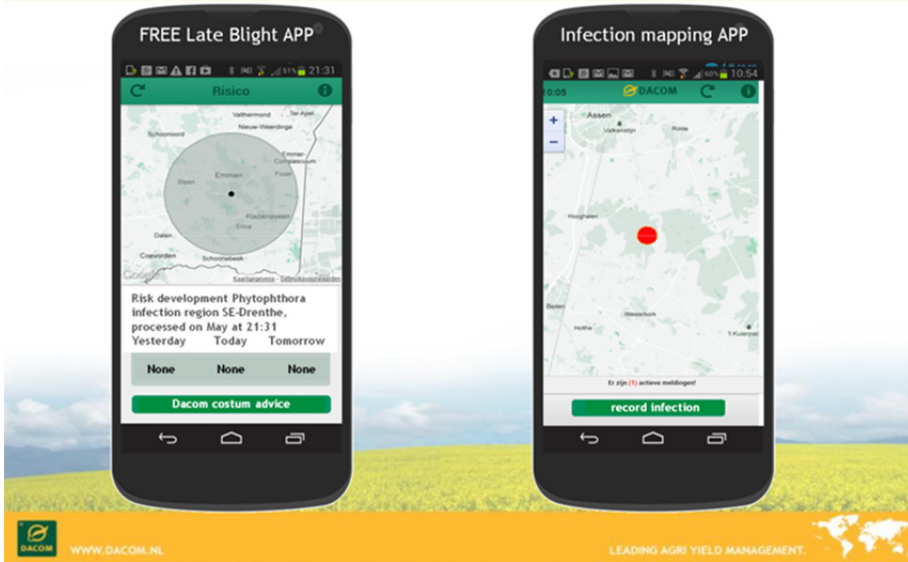

Figure 4

CONCLUSION

Instant availability of information is becoming rapidly a common feature. For agricultural science, it is a necessity to make the output of DSS models available on these new social platforms. In that way, research knowledge will be implemented by a broad group of farmers in an effective way. Dacom made a first step by transferring her *P. infestans* model to mobile platforms.