

Early blight diagnostics in potato: Diagnostics: difficulties and digitalisation

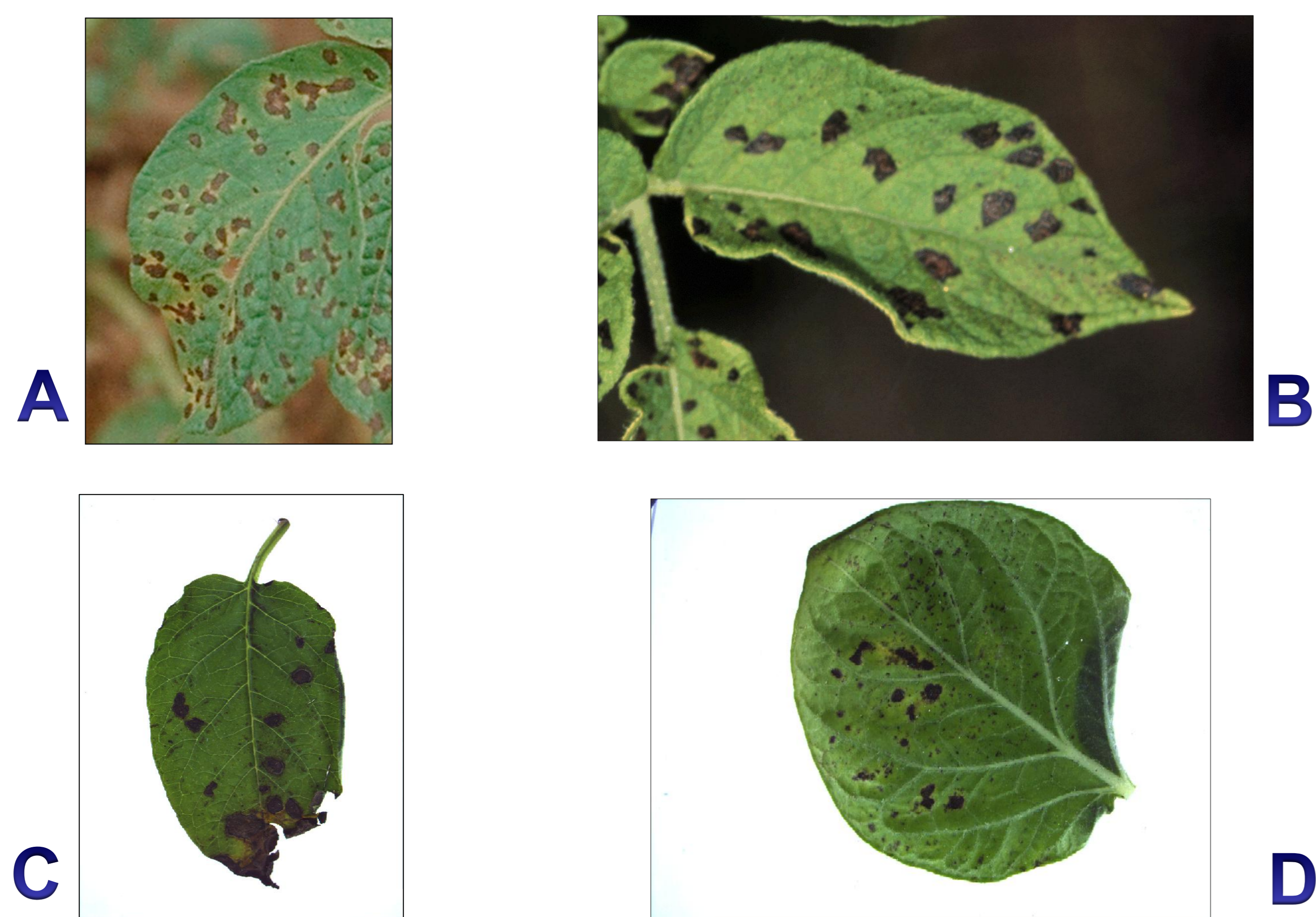
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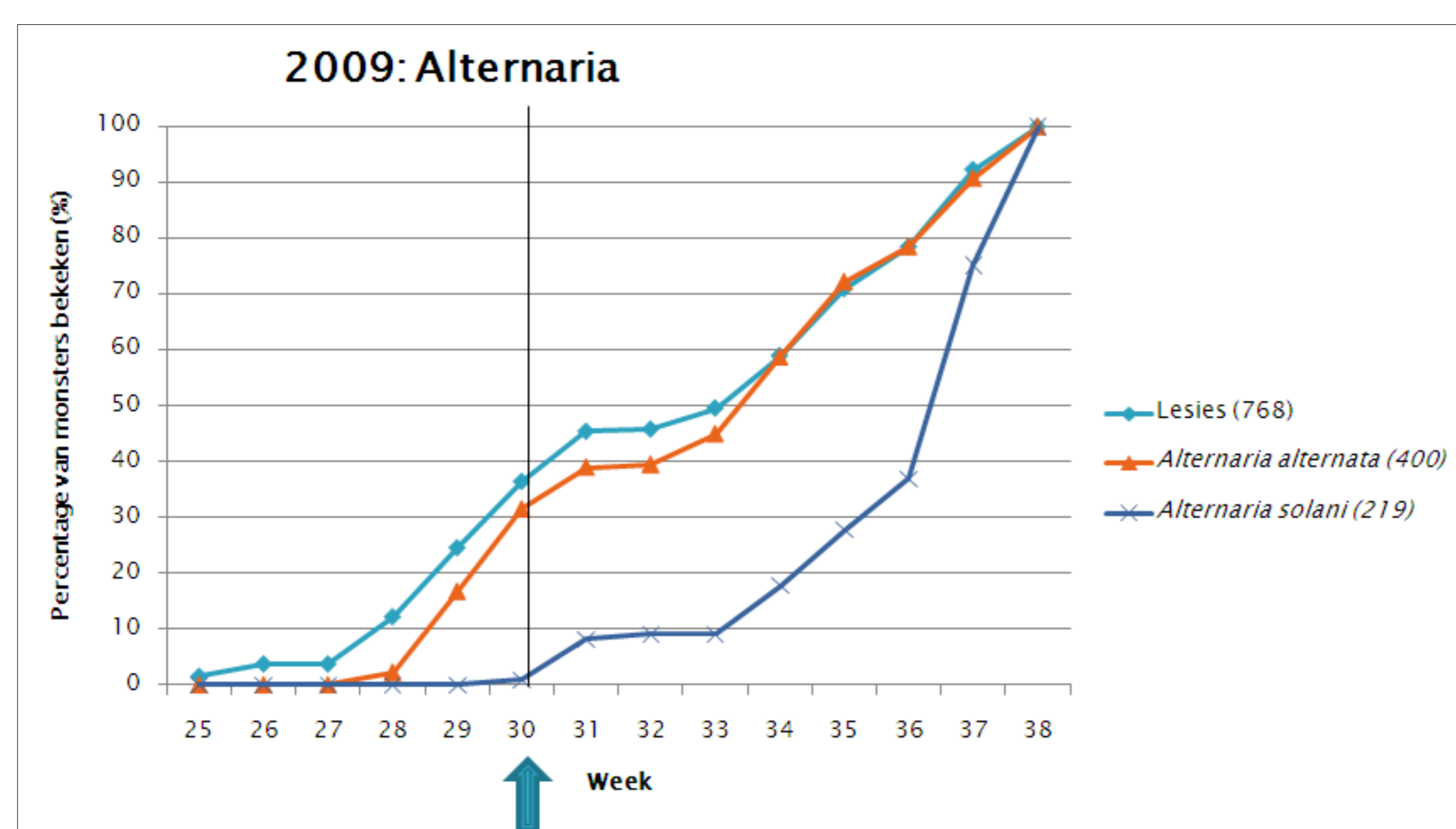
Early blight diagnostics

Find the early blight (*Alternaria solani*)!



Four potato leaflets, each showing similar symptoms. Which one, if any, is actual early blight? The correct answer is shown at the bottom of the poster!

Diagnosis of early blight has proven difficult, as demonstrated in 2009 and 2010: Early blight is often confused with ozone damage, which is potentially more damaging to yield than the blight.



Experts brought in early blight samples. It was not until week 30 when the first real early blight (*Alternaria solani*) appeared, indicated by the blue arrow. At this point over 35% of the total number of samples had falsely been identified as such in the field. Results in 2010 were similar to 2009.

The role of *Alternaria alternata* as a pathogen is currently debated: we have not been able to induce symptoms in lab- or fieldsituations and the fungus is mostly found as a saprophyte in lesions.

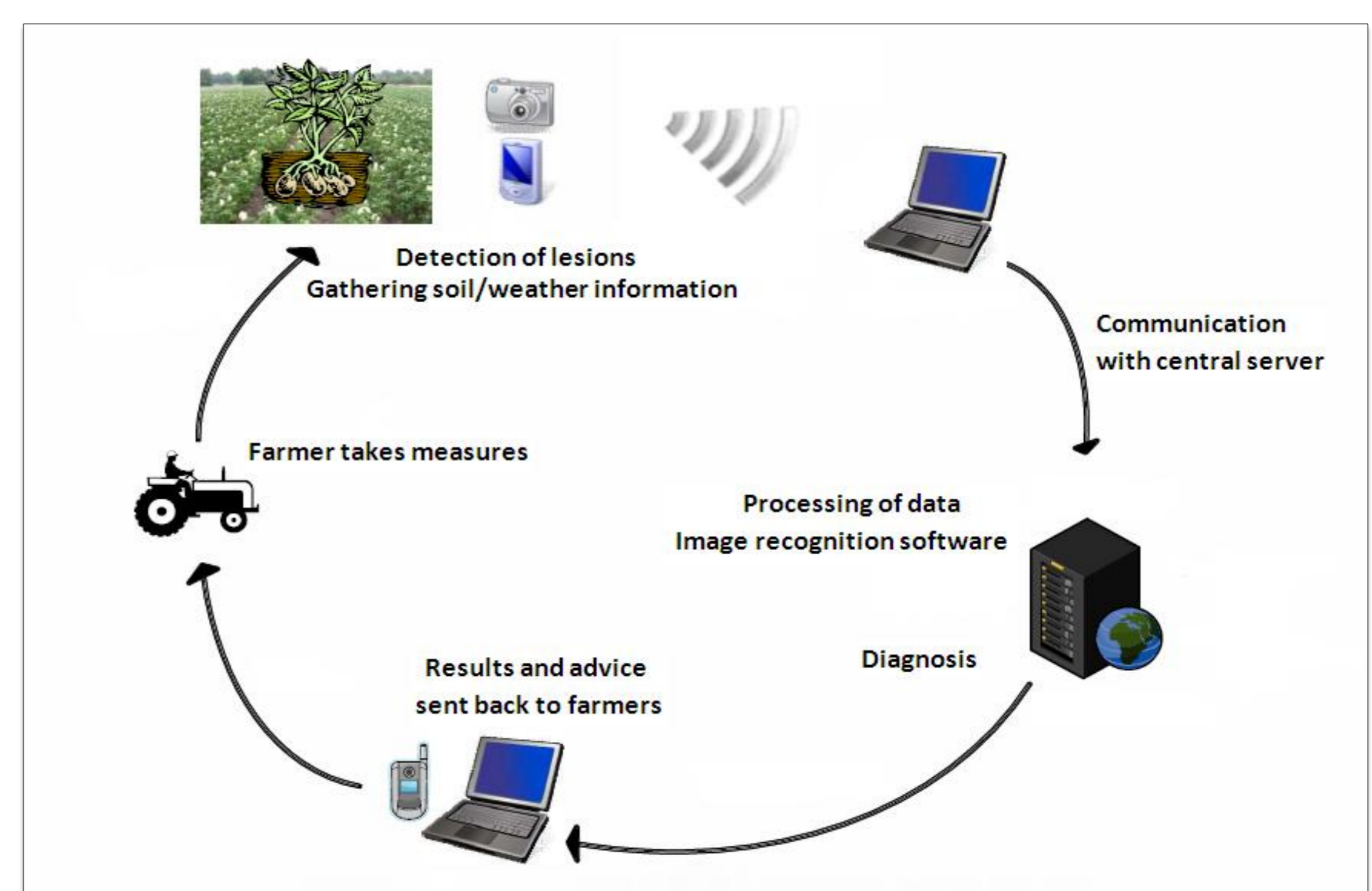
Results show that diagnostics of early blight can be difficult, resulting in unnecessary applications of fungicides. This is detrimental for the environment and the economic yield for farmers. It also leads to increased resistance development of *Alternaria* to a number fungicides.

More knowledge and a different approach are useful to correctly diagnose early blight.

Digital diagnostics

Current diagnostics is relatively slow and costly: time lost here is time gained for the disease to spread

Combining fielddata and image recognition software leads to faster diagnosis of crops with symptoms:



The project started by characterizing differences between symptoms caused by early blight and those caused by other, mostly physiological, diseases, such as ozone damage.

Image recognition software is not perfect and the human eye and brain are surprisingly complex and difficult to capture in "computer-language". Therefore, image recognition by itself is not enough and other data is needed to produce the correct diagnosis.

Cultivar, nutrients, temperature, humidity and other factors influence the occurrence of diseases. Data concerned is obtained from farmers or sensors located in the field and combined with image recognition to produce the correct diagnosis.



Expansion to other diseases in other crops is planned in the coming years, as well as continuous testing and adjusting of our systems. Field trials will be used to obtain insight into symptom development and many samples will be taken from around the country and continent to further improve the reliability

A: manganese excess, B: ozone damage, C: early blight, D: ozone damage
Image "B" courtesy of Håkan Pleijel