Fire blight in Hungary between 1996 and 2003

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Summary: Shoot blight of pome fruits caused by *Erwinia amylovora*, i.e. fire blight, is present in numerous countries of Europe. The disease must have entered into Hungary in the middle of the 1990's and it was first noted and, respectively, identified in 1996 (Bács-Kiskun county). The losses caused by the pathogen appeared – in orchards and scattered sites of production – in four counties, namely Bács-Kiskun, Baranya, Békés and Csongrád at the beginning. From June 1996, a process of eliminating infected parts started in the course of a large action performed under the control of the Department of Plant Protection and Agro-Environmental Economy of the Ministry of Agriculture, under the direction of the plant protection inspectors of the then existing Stations of Plant Health and Soil Conservation. The 'operation' against the disease commenced by cutting back out the infected parts of the canopy and, grubbing them out, respectively. As for the spread of the pathogen (1996–1998) it could be observed that the disease entered into Hungary from the south, south-east and then it also spread into the middle part of the country. As a result of adequate official action and efforts as well as of adequate chemical and antibiotic treatments, moreover because of the introduction of more modern technologies of plant cultivation and those of plant protection it can be reported on that the pathogen hardly appears or does not occur at all on the northern, north-western part of the country. The infection also appears mainly on the parts east of the Danube. Cultivars less susceptible or non-susceptible to the disease are planted in recently established orchards what is also a considerable factor in respect of preventing spread of the pathogen.

Key words: *Erwinia amylovora*, fire blight

Occurrence and survey of the infection; control work

The first suspicious shoots were found in Bács-Kiskun county that were delivered to the Laboratory of Bacteriology in Pécs to be identified in 1996. The fact of the infection caused by the pathogen *Erwinia amylovora* was confirmed by the identification lab-examination performed. Following that the competent authority first put the settlement in where the pathogen appeared under plant sanitary quarantine then the Ministry ordered a governmental prevention against the disease for what they also ensured the required subsidy. The control work had to be organised and performed by the plant protection authority of the county under review.

The initial infection could be observed in the southern, south-eastern counties then the pathogen spread northward. Nevertheless, the disease did not get into each county concerned; it only appeared scatteredly at most. The competent authority put the settlements in where the pathogen appeared under plant sanitary quarantine.

The pathogen occurred in apple and quince orchards in Bács-Kiskun county in 1996. In that very year the disease appeared in scattered sites of production and home gardens in Bács-Kiskun, Baranya, Békés and Csongrád counties.

Later on, i.e. in the following years (1997–1999) the infection occurred in the surrounding counties, namely in Hajdú-Bihar, Szabolcs-Szatmár-Bereg, Borsod-Abaúj-Zemplén, Heves and Zala. In 2000, the infection got into Pest, Tolna, Fejér, Jász-Nagykun-Szolnok, Veszprém and Somogy counties.

Two infection peaks could be observed in the counties concerned between 1996 and 2003. The first infection peak was observed both in scattered sites of production and orchards in 1996: Bács-Kiskun, Baranya, Békés, Csongrád counties. The second peak took place in 2000: in orchards: everywhere except for Fejér, Győr-Moson-Sopron, Heves, Komárom-Esztergom, Nógrád and Vas counties; in scattered sites of production: everywhere except for Komárom-Esztergom, Nógrád, Pest, Tolna, Vas and Zala counties. As for the subsequent 1–3 years the quantity of trees grubbed out, or cut back to remove the strikes of fire blight was considerable mainly in Szabolcs-Szatmár-Bereg and Hajdú-Bihar counties, the main reason for what was the systemic infection. Most of the infection occurred in apple and pear orchards but the losses caused by the disease in quince orchards and in scattered sites of production were not negligible either. There are regions in Hungary where quince have had to be eradicated nearly to the full (Békés county). That can be attributed mainly to the fact that quince bloom rather late, i.e. in the period when the weather conditions are favourable to the increase of epiphytic population, therefore the plants susceptible to fire blight can become infected easily. It can also be observed that now there are hardly any pome fruit shrubs (hawthorn, firethorn, cotoneaster and mountain ash) of common use in these areas, because they have had to be eradicated.

The pathogen caused considerable losses mainly in pear orchards in Zala county. In 1996, suspicious died branches were found what made it presumable that the infection would start in the following years. In 1997, there was an epidemic

outbreak of the disease, and the susceptible (mainly pollen spender) cultivars had to be grubbed out to the full. The infection spread to the whole orchard that caused severe losses. As much as 60 persons have been performing control work in the orchard since then. They inspect the orchard day by day and cut out the infected branches. The above-mentioned persons also watch the surroundings of the orchard in question carefully in order that the site should not become reinfected and that any host plant of the pathogen should not be present. The trees grubbed out are replaced by cultivars, only, that are not susceptible to the pathogen.

In 2003, in the commercial orchards successful control work was performed with the help given by the local governments and, by the labour offices concerning home gardens (in some counties).

The numerical data of the trees grubbed or cut back in orchards and scattered sites of production, as well as in home gardens between 1996 and 2003 and, in 2003 are shown in diagrams 1–8. The areas which had to be closed because of the presence of fire blight are shown in figures 1–2.

Prediction, prevention

The MARYBLYT model has been used since the spring of 1997 for predicting *Erwinia amylovora* blossom infection for the cultivar of 'Jonathan' as for apples and 'Vilmos' in the case of pears. The growers having commercial orchards supply data from different parts of the counties – by using LUFT and METOS meteorological stations in pome fruit orchards, while in the case of home gardens by applying a minimum-maximum thermometer and a rain-gauge. The data suppliers provide the required data of the growth stage of trees and blossom phenology, the minimum-maximum temperature, the amount of rainfall, other weather conditions (rime-frost, dew, fog, windstorms) and events by taking account of spraying performed with a considerable quantity of spray liquid, bactericide at flowering over the phone every day.

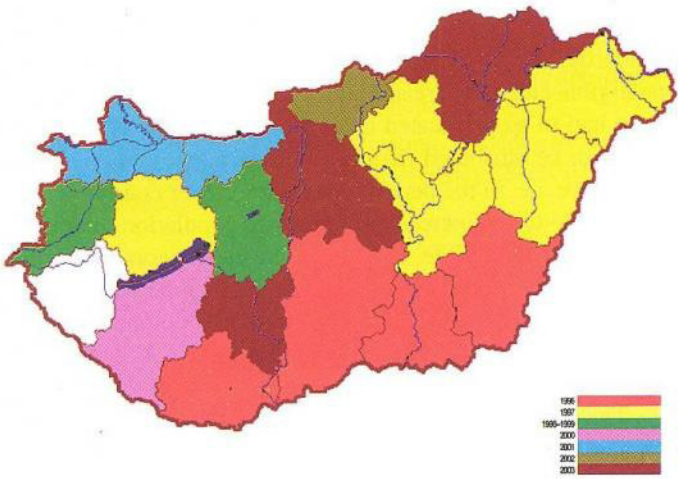

Figure 1 Closed areas concerning home gardens of Hungary between 1996–2003.

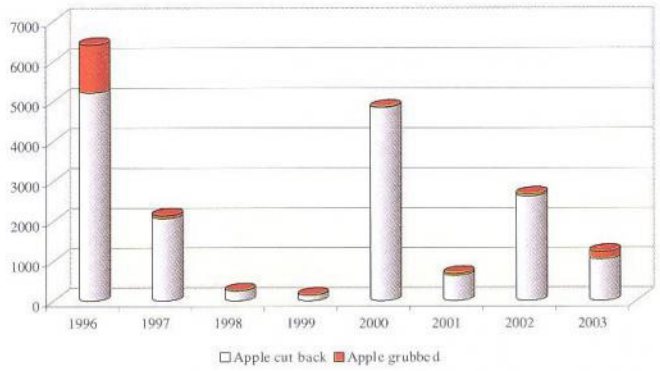

Diagram 1 Number of apple trees cut back and grubbed due to infection caused by *Erwinia amylovora* in scattered sites of production in Hungary

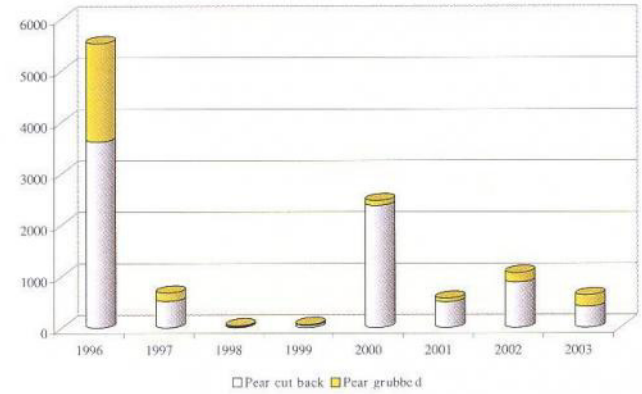

Diagram 2 Number of pear trees cut back and grubbed due to infection caused by *Erwinia amylovora* in scattered sites of production in Hungary

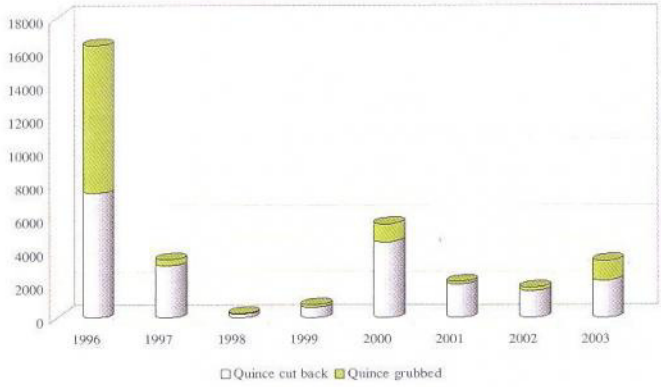

Diagram 3 Number of quince trees cut back and grubbed due to infection caused by *Erwinia amylovora* in scattered sites of production in Hungary

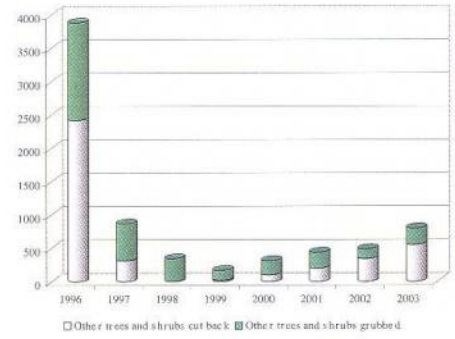

Diagram 4 Number of other trees and shrubs cut back and grubbed due to infection caused by *Erwinia amylovora* in scattered sites of production in Hungary

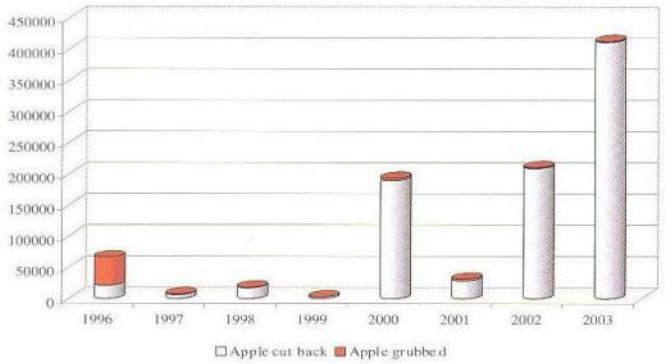

Diagram 5 Number of apple trees cut back and grubbed due to infection caused by *Erwinia amylovora* in commercial orchards in Hungary

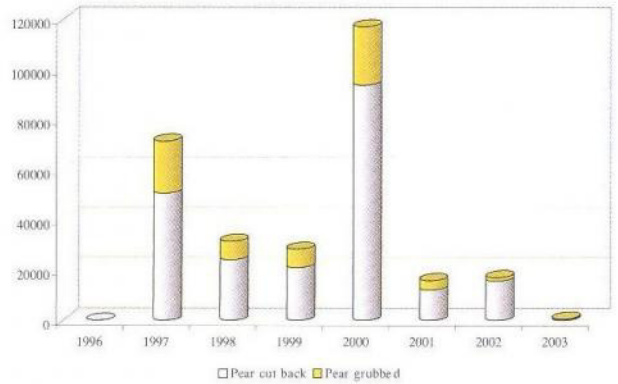

Diagram 6 Number of pear trees cut back and grubbed due to infection caused by *Erwinia amylovora* in commercial orchards in Hungary

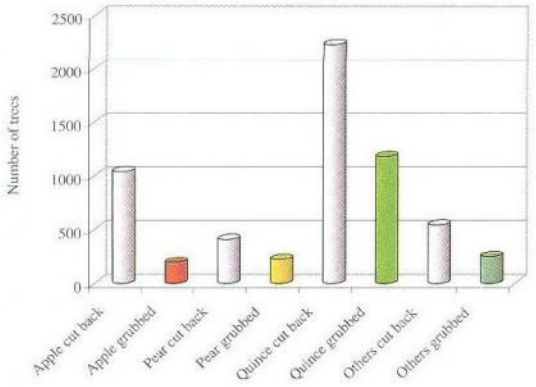

Diagram 7 Number of trees cut back and grubbed due to infection caused by *Erwinia amylovora* in scattered sites of production in Hungary, 2003.

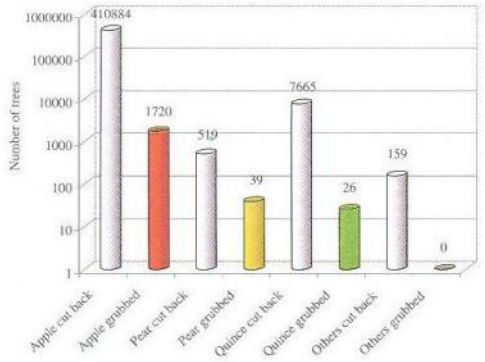

Diagram 8 Number of trees cut back and grubbed due to infection caused by *Erwinia amylovora* in plantations in Hungary, 2003.

We usually start running the program from the end of March or the beginning of April, i.e. at about the end of dormancy of the trees. One of the essential points of the prediction is that the budbreak stage, which is to be defined accurately, because the program starts calculating the degree-days from the above-mentioned stage.

Bud break stage is when 50% of the buds break up, and the green tips are about 5 mm above bud scales.

The other important growth stage is the beginning of bloom, when the first flowers open, because, theoretically the hazard of bacterial infection exists from the above-mentioned stage until the end of bloom and during secondary bloom, if the cultivar is susceptible to the infection.

The program calculates the epiphytic infection potential, expressed in %, on the basis of the meteorological data received, that is, the figure of percent calculated indicates the value of how many percent of the degree-hours (apple: 198 hours, pear: 120 hours) needed for the blossom infection has accumulated.

The infection can develop in the period of blooming if the mean temperature is above 15.6 C (shown as 'critical temperature' in the figure), there is rainfall (rainfall of only 0.25 mm can also be sufficient, which is equal to a dew, or a fungicide spraying) and the infection potential is or above 100%.

Chemical and antibiotic control has to be performed when the critical degree is reached in the orchards. (From 1st May of 2004, i.e. from the date of the accession of Hungary to the European Union, it will be forbidden to use antibiotics for control of the pathogen in pursuance of the relevant regulation!) The plant protection authority of the counties determine the date of the mandatory control to be performed by issuing an official decision which they advertise through the different media (TV, radio, daily papers) and they specially inform the owners of orchards concerned, too. After the mandatory prevention is ordered, when the control has been performed – in accordance with the relevant official decision issued, the authority check on the control, make sure

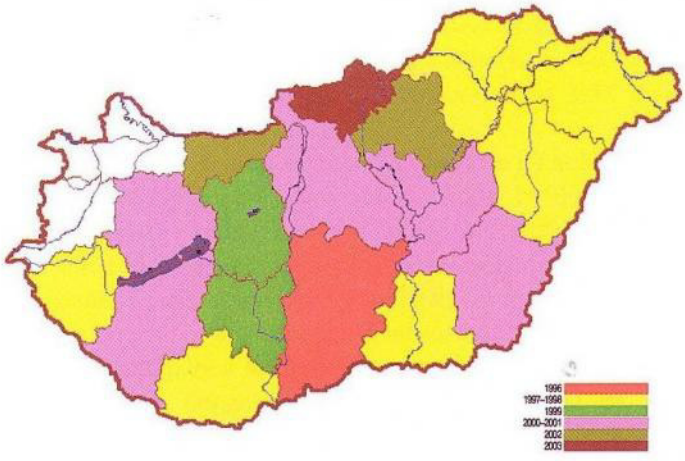

Figure 2 Closed areas concerning comercial orchards in Hungary between 1996–2003.

if it has been performed and documented adequately (spraying logbook). As for our experience it can be stated that the large producers carry out the tasks ordained by the relevant law properly, in accordance with their own interests. Modern technologies of fruit production and those of plant protection have been introduced and are being improved beside chemical control. It is very important to plant cultivars which are not susceptible to fire blight. Furthermore, new orchards should only be planted in areas that are adequate to the particular cultivar in respect of nutrient management and soil conditions. In the case of orchards established in inadequate areas, the trees develop weakly, a slowly and they can easily become infected which also creates favourable conditions to spread of the pathogen.

Conclusion

As a result of the growers' positive approach, proficiency and the efforts of the plant protection authority by continuous attention, and by adequate plant protection technologies applied and by adequate nutrient supply as well as by choosing non-susceptible cultivars and rootstocks, the general situation has been successfully stabilised in spite of the great deal of cutting back performed.

In the case of the prevention performed in home gardens the approach of the owners concerned was satisfactory and positive. At the same time, in the case of scattered sites of production the approach of the inhabitants concerned is still not fully positive. Therefore, the pathogen might reappear and cause losses even in the form of shoot blight next year.

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