Occurrence of Stone Fruit Yellows Phytoplasma Disease (*Candidatus* Phytoplasma prunorum) in Hungary and Central Europe

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Abstract

Plant diseases caused by phytoplasmas have an increasing importance all over the world for fruit growers. Lately, phytoplasma diseases occur on many fruit species and are responsible for serious losses both in quality and quantity for fruit production. Apricot phytoplasma disease (*Candidatus* Phytoplasma prunorum) was reported first from France in Europe in 1924. Then, the pathogen spread in all European apricot-growing areas. In 1992, the disease was identified in Hungary first. Based on the growers' signals, serious damage of *Ca.* Phytoplasma prunorum (Seemüller and Schneider, International Journal of Systematic and Evolutionary Microbiology, 54, 2004, 1217–1226; formerly: European stone fruit yellows (ESFY) phytoplasma) could be observed in several stone fruit orchards in the famous apricot-growing area nearby the town of Gönc, northern Hungary. Field examinations were started in 2009 in the infested stone fruit plantations in Borsod-Abaúj-Zemplén County mainly in Gönc region, which is one of the most important apricot-growing areas in Hungary, named "Gönc Apricot-growing area". Our goals were to diagnose the occurrence of *Ca*. Phytoplasma prunorum on stone fruits (especially on apricot) in the North Hungarian growing areas by visual diagnostics and to confirm data by laboratory polymerase chain reaction (PCR)-based examinations. All the 40 collected samples were tested in laboratory trials and in 22 samples from apricot, peach, cherry, sour cherry and wild plum were confirmed the presence of phytoplasma (ESFY). Field investigations were done in a western Romanian apricot plantation, and the presence of

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apricot phytoplasma disease was confirmed. It was the first finding that *Ca*. Phytoplasma prunorum occurred in the western part of Romania. On the basis of these observations, it seems evident that the notable losses caused by *Ca*. Phytoplasma prunorum is a new plant health challenge for fruit growers to manage, especially for apricot producers in Hungary and other central European countries.

Keywords

Phytoplasma · *Ca.* Phytoplasma prunorum European stone fruit yellows phytoplasma · Gönc apricot-growing area · Stone fruits · Apricot · Peach · Cherry · *Cacopsylla pruni*

17.1 Introduction

17.1.1 Importance of Phytoplasma Diseases

Plant diseases caused by phytoplasmas have increasing importance for fruit growers. Phytoplasma diseases occur on several crops throughout the world, and these pathogens cause serious economic losses in cultivated fruit and various field crops. In the long run, these diseases cause the destruction of the fruit producing trees.

Until 1967, plant diseases known as "yellows diseases" were thought to be caused by viruses. In 1967, Japanese researchers (Doi et al. 1967) found microorganism by electron microscope in yellows diseased plants. This new class of plant such a disease agents was named "mycoplasma-like organism" (Welliver 1999). Mycoplasma-like organisms (MLOs) are nonculturable, parasitic prokaryotes of the class Mollicutes associated with diseases of several hundred plant species (McCoy et al. 1989). Until recently, their differentiation and characterization was mainly based on host range and the symptoms induced in natural hosts and in the experimental host *Catharanthus roseus* (periwinkle) (Marwitz 1990). The need for more reliable and specific traits to classify MLOs has resulted in the development of MLO specific serological and DNA hybridization assays (Kiske et al. 1991). In 1992, characterization of the organisms associated with yellows diseases had progressed to a point where they were recognized as unique and so were given their own name: phytoplasma (ICSB 1993; Gundersen et al. 1994).

Phytoplasmas are single-celled organisms that are similar to bacteria but lack a rigid cell wall. Phytoplasmas are obligate parasites. They grow and reproduce in the cytoplasm of host cells, both in insect vectors and in plants. Phytoplasmas are very small agents. They look like amorphous sacks or blobs, ranging from 70–1.000 nm in diameter. Phytoplasmas reproduce asexually by budding. Phytoplasmas reside in the phloem tissues of the plants, and are transmitted by phloem-feeding insect vectors. Phytoplasmas cannot be transmitted mechanically.

Phytoplasmas are serious pathogens of several important plants, including coconut, sugarcane, rice, sandal wood in tropical and subtropical regions of the world, causing a wide variety of symptoms that range from mild yellowing to the death of infected plants. Phytoplasmas also cause very serious diseases on several important crops and fruits in the temperate zone. Stolbur disease of potato and tomato (*Ca.* Phytoplasma solani) is one of the most common plant diseases caused by phytoplasmas. Apple and pear also have phytoplasma-originated diseases (*Candidatus* Phytoplasma mali, *Candidatus* Phytoplasma pyri), but grape and maize are also endangered by these pathogens. Phytoplasmas require a vector to be transmitted from plant to plant, which normally takes the form of sap sucking insects such as leaf hoppers, in which they are also able to replicate.

17.1.2 Importance of Apricot in the World and in Hungary

Apricot (*Prunus armeniaca* L.) is one of the most favourite fruits in Hungary and in Europe. Products made from apricot are also popular in Europe. The most important apricot-growing countries are in southern Europe and in the Middle East. The Mediterranean coastal area has the most advantageous climatic conditions for apricot growing. Turkey is the greatest apricot producer in the world with more than 500.000 t yield per year. In Europe, Italy is the main apricot producer country, while France, Spain, Greece are also important growers. Apricot is also a notable fruit crop of mid-hill and dry-temperature regions of India, especially in Himachal Pradesh, Jammu and Kashmir and Uttar Pradesh. According to historians: "The origin of the apricot's domestication was in the Chinese region, but another source says the apricot was first cultivated in India in about 3000 BC" (Huxley 1992).

Hungary also belongs to the main European apricot-producer countries. It has several excellent apricot-growing sites, and apricot cultivation has a long history in Hungary. The best apricot yields were in the 1960s with more than 130.000 t per year. Although Hungarian apricots are easy to sell because of their excellent flavour, nowadays there is not enough quantity in the country. The apricot production has decreased considerably in the Hungarian apricot-growing sites over the last 20 years. The reasons of losses in quantity of apricot production in Hungary are as follows: the uncertain weather conditions, the ageing of several plantations, the unfavourable economical situation for fruit growers and several plant diseases.

17.1.3 Phytoplasma Disease on Apricot and Other Stone Fruits

Currently, one of the most important reasons of apricot yield loss in Hungary is the phytoplasma disease. Until 2004, it was named European stone fruit yellows phytoplasma (ESFY) (Kövics 2009). Since 2004, the new official name of the pathogen has been *Ca.* Phytoplasma prunorum (Seemüller and Schneider 2004). Although the disease is well known in many European countries (Lederer and Seemüller 1992), it is a relatively new and serious pathogen for the apricot cultivation in Hungary and the neighbouring central European countries in the Carpathian basin. Moreover, the pathogen is able to infect other stone fruit species (e.g. peach, cherry, and sour cherry).

Apricot phytoplasma disease (named that time as "apoplexy") was reported first in Europe in 1924, from France, (Chabrolin 1924) and then the pathogen was observed in several other European apricot-growing countries (Lederer and Seemüller 1992). In many European countries the disease has been identified as one of the most prevalent problems threatening apricot trees (Jarausch et al. 2001; Navratil et al. 2001; Torres et al. 2004). In 1992, the disease was also observed on apricot in Hungary (Süle, unpublished) although its symptoms had been suspected before too. Later on (Viczián et al. 1997; Süle et al. 1997), the occurrence of the ESFY was confirmed by molecular biological examinations in Hungary. After that, similar symptoms were also observed on other stone fruits (Mergenthaler 2004). The occurrence of phytoplasma was observed in peach (Németh et al. 2001), Japanese cherry (*Prunus serrulata*) (Lorenz et al. 1994), Mahaleb cherry (*P. mahaleb cv.*) Cemany (Varga et al. 2001) and Blackthorne (*P. spinosa*) (Jarausch et al. 2001) as well. According to earlier natural experiences and examinations based on artificial inoculation, several kinds of plum are tolerant to *Ca.* Phytoplasma prunorum. European plums have been determined to be tolerant to *Ca.* Phytoplasma prunorum, whereas Japanese plums (*P. salicina*) are highly susceptible (Carraro et al. 1998; Mona et al. 2008). The pathogen is able to propagate in the tolerant host plum trees without any typical symptoms, therefore these trees obviously have an important role in the spreading of the pathogen (Morvan 1977; Carraro et al. 1998). The psyllid *Cacopsylla pruni* (Scopoli Fig. 17.1) was described as the main vector of *Ca.* Phytoplasma prunorum (Carraro et al. 2001; Fialová et al. 2007). Occurrence of phytoplasma disease on cherry was reported in France as "Molieres-disease" (Bernhard et al. 1977), but several ex-

Fig. 17.1 The vector of *Ca.* Phytoplasma prunorum–*Cacopsylla pruni.* (Source: Dr Wolfgang Jarausch, Agroscience)

perts thought that cherry is resistant to phytoplasma infection (Jarausch et al. 2000).

Symptoms of *Ca.* Phytoplasma prunorum disease are visible on the leaves, the branches and the bark. Yellow colour change and rolling of leaves can be seen. General yellowing and "scalding-like" dryings are visible on the branches. There is an orange to light brown colour change in the phloem. Finally, the disease causes a "sudden death" of apricot trees, similar to the destruction of another important apricot disease, the apricot die-back (apoplexy) caused by fungal (*Cytospora* spp.), bacterial (*Pseudomonas syringae*) pathogens and abiotic reasons (e.g. frost damage). However, there is a significant difference between the destructions of these diseases. In the case of phytoplasma disease, there is no secretion of resin in contrast with apoplexy.

17.2 Materials and Methods

In Hungary, there are eight great apricot-growing areas (Balaton, Mecsek, Lake-Velencei, Buda, Pest-Gödöllő, Mátra-Bükkalja, Area between Danube and Tisza Rivers and Gönc). One of the most important sites is the Gönc Apricot-growing area, situated in Borsod-Abaúj-Zemplén County, northern Hungary, which was the main location of our field observations. Field examinations were done on several stone fruit orchards on Gönc Apricot-growing area between 2009 and 2011 (12 apricot, 1 peach, 4 sour cherry, and 1 cherry plantations). That place is among the most favoured growing areas for stone fruits, especially for apricot in central Europe. Besides, field examinations were also done in Hajdúdorog, close to the Gönc region (in a neighbouring county, Hajdú-Bihar) and in another region near Oradea city, which belongs to Romania (close to the Hungarian border) in 2010–2011.

Table 17.1 Scale of infection index (*Ii*) classification system. (Tarcali and Kövics 2009)

Infection degrees	Symptoms
I	Healthy tree
II	Symptoms on leaves, on one branch
III	General yellowing or drying, symptoms on several branches
IV	One dead branch
V	Dead or felled tree

The main objectives of the research were to:

- Visually check of *Ca.* Phytoplasma prunorum infection on stone fruits (especially on apricot) on the examined northern Hungarian and Romanian growing areas.
- Calculate the infection ratio ($I\%$) and infection index (*Ii*) (according to a classification system (Table 17.1)) in the various stone fruit plantations based on the visible symptoms of the disease caused by *Ca.* Phytoplasma prunorum.

The classification system contains five infection degrees, and the symptoms get more heavy from the first degree to the fifth degree. Infection degrees were classified on the basis of the following symptoms:

- On leaves: yellow colour change and rolling of leaves to its abaxial surface
- On branches: general yellowing or "scalding-like" drying
- In the trunk: having striped the bark of tree, orange or light brown colour change is visible in the phloem
- On trees: general yellowing on several branches or general drying; withered, dead or felled tree, and there is no secretion of resin
- At the plantation: infections and destruction of trees starting in a circular direction around the infected tree.

Table 17.2 Used sequences and programmes on laboratory examinations

Name of primer (1)	Sequences (5´–3´) (2)	Position (bp) (3)	Programme (4)
P1	AAGAGTTTGATCCTG-GCTCAGGATT	6–28	94 °C-5 min; 94 °C-1 min 55 °C-1 min 72 °C-2 min (35 cycle); 72 °C-10 min
P7	TTCTCGGC-TACTTCCTGC	1.818–1,836	
fU5	CGGCAATGGAG-GAAACT	370–387	95 °C-3 min; 95 °C-1 min 55 °C-1 min 72 °C-1 min (35 cycle); 72 °C-5 min
rU3	TTCAGCTACTCTTTG-TAACA	1,230–1,250	
ECA1	AATAATCAAGAA-CAAGAAGT		95 °C-1 min; 95 °C-30 s 55 °C-30 s 72 °C-30 s (35 cycle); 72 °C-3 min
ECA2	GTTTATAAAAATTAAT-GACTC		
fO1	CGGAAACTTT-TAGTTTCAGT	61–81	94 °C-3 min; 94 °C-1 min 55 °C-1 min 72 °C-1 min (35 cycle); 72 °C-7 min
rO1	AAGTGCCCAACTAAAT-GAT	1,115–1,135	

Around 100 trees were examined on a researched site (except the smaller fruit gardens), out of which 10 fruit trees of a circle were randomly selected for examination from 10 circles.

Plant samples were collected from the supposedly infected trees, based on the visible symptoms (living leaves, pieces of branches and pieces of roots) by a sharp sampling knife for further laboratory examinations. The identification of phytoplasma is only possible from living plant parts. Identification is not possible from dead plant samples because of the life of the pathogen twit to the living phloem of the plant (Mergenthaler 2004). In the laboratory, molecular biological examinations were applied (PCR) to confirm the presence of the phytoplasma. The primers, sequences and programmes which were applied on the PCR examination in order to identify the phytoplasma are shown in Table 17.2.

The venue of the laboratory examinations was at the molecular biology laboratory of the Plant Protection Institute, University of Debrecen, in Debrecen, Hungary, and in the Sequence Laboratories Göttingen GmbH, in Göttingen, Germany. First, universal primers and sequences (fP1/rP7, fU5/rU3) were used to prove the phytoplasma infection in the examined plant samples (Kirkpatrick et al. 1994). Then, group-specific primers (fO1/rO1, ECA1/ECA2) were applied to identify species of phytoplasma (Kirkpatrick et al. 1994; Jarausch et al. 1998).

17.3 Results and Discussion

17.3.1 Results of the Field Examinations

Our examination on the research of *Ca.* Phytoplasma prunorum began on 2nd October 2009, when we visited the first infested stone fruit orchard in the village of Bekecs (near Szerencs city). The first visual experience was the view of a very depressing situation of the apricot plantations in the Gönc apricot-growing area. Several apricot plantations were heavily destructed by phytoplasma disease, and a great number of apricot trees were dead or felled in the orchards (Fig. 17.2). Yellowing and rolling leaves on the apricot branches and several drying branches were found on the apricot trees (Fig. 17.3). A similar situation was visible on peach (Fig. 17.4), and the same situation was experienced on cherry and sour cherry trees (Fig. 17.5).

A comparatively new, only 4-year-old apricot plantation was examined first. Most trees were healthy, but there were a few trees (2 %) infected by *Ca.* Phytoplasma prunorum (Table 17.3). According to the description of Süle et al. (2003),

Fig. 17.2 Stumps of destructed and felled apricot trees

Fig. 17.3 Yellowing leaves on apricot trees

Fig. 17.4 Yellowing branches on peach

the first symptoms of the pathogen can be observed from the age of 3 or 4, and this thesis was justified in the visited apricot orchard.

The second apricot plantation was about 8 or 9 years old. At first glance, it was clearly visible that there is a very serious destruction on apricot trees caused by phytoplasma. More than 50 % of

Fig. 17.5 A dried and felled sour cherry tree

the trees were infected and 40 % of apricot trees were dead. Most of the killed trees were felled (about 35 %). The owner of the plantation said that in the previous year only one to two trees showed the symptoms of the disease. The general drying has begun in the year 2009 at the end of the blooming of apricot trees (in the first half of May), and then destruction has progressed fast. There was another interesting fact to observe. As there were a few old plum trees among the apricots in the fruit garden, the presence of *Cacopsylla pruni* on the plum trees was evident, which is the main vector in the transmission of the pathogen (Fig. 17.1).

The varieties of apricot grown on the plantations were the following ones: Ceglédi Óriás (Cegléd Giant), Ceglédi Arany (Cegléd Gold) and Magyar Kajszi (Hungarian Apricot). The Cegléd varieties (a new local one in Hungary) are more susceptible to phytoplasma disease than the old variety, the Hungarian Apricot.

A serious destruction of 85 % was experienced in the third apricot orchard on 3 ha. It was the most heavy infested and destructed apricot population among the examined fields. A very serious infection ratio was measured; out of the 100 sample examined trees as many as 85 were infected, and according to the classification system (Table 17.1), 65 were found dead or felled, as shown in column V. of Table 17.3. The sight was similar on the fourth examined plantation, where 12 to 13-year-old apricot trees are grown; 25 % of apricot trees were dead, and another 35 % were in the phase of fast destruction.

Table 17.3 Phytoplasma infection data on the examined fruit plantations (results of field examination)

No.	Date of field examination	Tree species	Age (year)	Area (ha)	Number of trees	Degree of infection					Ii	I%
						I	II	III	IV	V		
1	02.10.2009.	Apricot	4	20	100	98	1	1	–	–	1.03	2
2	02.10.2009.	Apricot	8–9	5	100	45	4	6	5	40	2.91	55
3	02.10.2009.	*Apricot*	*8*	*3*	*100*	*15*	*7*	*7*	*6*	*65*	*3.99*	*85*
4	02.10.2009.	Apricot	12–13	10	100	30	6	4	35	25	3.21	70
5	02.10.2009.	Peach	8	6	100	79	7	2	2	10	1.57	21
6	02.10.2009.	Cherry	10	22	100	70	9	4	6	11	1.79	30
7	02.10.2009.	*Sour cherry*	*8–9*	*5*	*100*	*38*	*14*	*10*	*8*	*30*	*2.78*	*62*
8	02.10.2009.	Sour cherry	7	5	100	91	3	1	1	4	1.24	9
9	02.10.2009.	Sour cherry	30	8	100	64	6	9	13	8	1.95	36
10	07.09.2010.	*Apricot*	*13*	*22,6*	*70*	*11*	*12*	*2*	*10*	*35*	*3.66*	*84*
11	07.09.2010.	Apricot	13	22,6	78	17	6	3	11	41	3.68	78
12	07.09.2010.	Sour cherry	7	5	104	43	7	12	12	30	2.78	59
13	07.10.2010.	Apricot	21	50	100	41	10	9	11	28	2.72	59
14	07.10.2010.	Apricot	4	5	54	34	4	4	3	9	2.06	37
15	07.10.2010.	Apricot	~12	6	50	46	1	2	1	–	1.16	8
16	07.10.2010.	Apricot	~25	15	100	23	24	12	21	26	3.21	77
17	07.10.2010.	Apricot	~15	10	50	45	3	1	1	–	1.16	10
18	14.10.2010.	Apricot	25	6	100	97	2	1	–	–	1.04	3
19 (18)	06.08.2011.	Apricot	26	6	100	87	6	3	3	1	1.25	13
20 (2)	05.06.2011.	Apricot	10–11	5	100	35	7	8	7	43	3.16	65
21 (5)	05.06.2011.	Peach	10	6	100	81	6	–	1	12	1.57	19
22 (6)	05.06.2011.	Cherry	12	22	100	64	11	6	4	15	1.95	36
23 (9)	05.06.2011.	Sour cherry	32	8	100	55	11	10	15	9	2.22	45
24	25.05.2011.	Sour cherry	12	11	100	100	–	–	–	–	–	–

Spots of the field examinations: 1–9: Bekecs; 10–12: Bükkaranyos; 13: Rátka; 14: Göncruszka; 15: Vizsoly; 16: Boldogkőváralja; 17: Abaújkér; 18–19: Biharpüspöki (Romania); 20–23: Bekecs-2, -5, -6, -9, 24: Hajdúdorog

Other stone fruit species were also examined during the field investigations. A more moderate infection was observed in a 12 to 13-year-old peach orchard where phytoplasma infection with a rate of 21% was observed. The destruction rate on peach was not so high as it was on apricot, but the problem with *Ca.* Phytoplasma prunorum seemed to be evident. Three sour cherry and one cherry plantation were examined as well. On the first examined sour cherry plantation, the infection rate was very high (62%) and there were several withered or felled trees. It was easy to realize that sour cherry and cherry are also endangered by *Ca.* Phytoplasma prunorum infection.

Further field research was done during September and October 2010 in the Hungarian stone fruit orchards. Seven apricot and one sour cherry plantations were investigated in Borsod-Abaúj-Zemplén County, and one apricot orchard in another region in the village of Biharpüspöki, near the city of Oradea (western part of Romania). Very high infection rates were measured in Bükkaranyos on two apricot orchards (infection rate: 7–84%) and one sour cherry plantation (infection rate: 9%) as shown in Table 17.3. The rate of the totally destructed or felled trees was also very high. No high infection rates were measured in the examined Romanian apricot orchard, but the presence of apricot phytoplasma disease was evident. It was the first time that *Ca.* Phytoplama prunorum had been identified in the western part of Romania. Plant samples of the supposedly infected trees were collected for further laboratory research during each field examination.

Summarizing the results of the field experiences and the degree of infection, we can say that the plant health conditions of stone fruit plantations on the visited areas are rather bad (illustrated by the photos in Figs. 17.2, 17.3, 17.4, 17.5, 17.6, 17.7, 17.8 and 17.9).

Fig. 17.6 Dead apricot tree

Fig. 17.7 Dried branches on apricot tree

17.3.2 Results of the Laboratory Examinations

As many as 40 plant samples were collected on the fields, which were examined in laboratory by PCR. The presence of *Ca.* Phytoplasma prunorum was detected on 22 samples (Table 17.4). Phytoplasma infection was detected from the collected plant samples on all examined stone fruit species (apricot, peach, cherry, sour cherry, wild plum). The results of phytoplasma identifications using universal primers and group specific primers are shown on Figs. 17.10, 17.11 and 17.12. The presence of the pathogen without any typical symptoms in tolerant wild plum was also detected, and it is obvious that wild plum may have an important part in the spreading of the pathogen.

It was confirmed by the laboratory results that *Ca.* Phytoplasma prunorum is a rather serious danger for stone fruit plantations in Hungary.

17.3.3 Control Measures to Phytoplasmas

A promising strategy to avoid phytoplasma disease is the identification or development of resistant plant varieties (Welliver 1999). But management and control have to focus mainly on the clean stock programmes, eliminating sources of the phytoplasma and controlling vectors as follows:

- Propagates from phytoplasma-free plants
- Elimination of perennial and biennial weed hosts
- Avoiding planting susceptible plants next to plant-harbouring phytoplasma
- Controlling the vector in the plants and nearby weeds early in the season
- Planting varieties that are more resistant to the disease

The ecology of phytoplasmas is complex, and affected by the host range and geographic distribution of both phytoplasma and the insects that

Fig. 17.8 A destructed cherry tree

Fig. 17.9 Leaf rolling symptoms on peach

Table 17.4 Rates of examined and DNA-isolated samples of different fruit trees and the results of phytoplasma detection

Fruit tree species	Number of examined samples	Number of positive samples	Identified phytoplasma
Apricot (*Prunus armeniaca*)	21	12	ESFY
Peach (*Prunus persica*)	6	2	ESFY
Cherry (*Prunus avium*)	2	2	ESFY
Sour cherry (*Prunus cerasus*)	10	5	ESFY
Wild plum (*Prunus cerasifera*)	1	1	ESFY

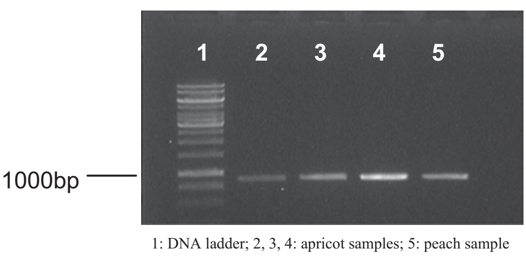
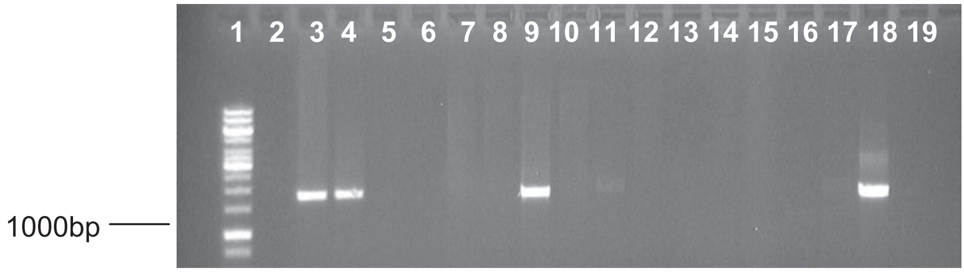


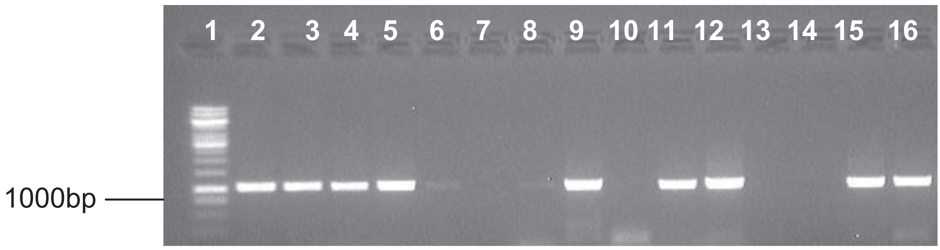
Fig. 17.10 DNA fragments amplified by FU5/rU3 primers in 1 % agarose gel

transmit them, and is strongly affected by weather conditions. As more is learned about relationships among causal agent, vectors and hosts, surprising ecological niches have been uncovered, and theories of how disease may have evolved have been developed. These suggestions may be important in choosing management strategies for disease, and in forecasting where new disease outbreaks may occur.



1: DNA ladder; 2,5,6,8,10,12,13,14,15,16: negative samples; 18: positive ESFY control; 19: negative control; 3, 4, 7: apricot samples infected by phytoplasma; 9: infected wild plum sample; 11, 17: infected sour cherry and cherry samples

Fig. 17.11 DNA fragments amplified by P1/P7 primers in 1 % agarose gel



1: DNA ladder; 2,9: direct PCR; 2, 3, 4: infected apricot samples; 5: infected wild plum sample; 6, 7, 8: negative sour cherry and peach samples; 9: positive ESFY control; 10-16: nested PCR: 10: negative control; 16: positive ESFY control; 11: infected apricot sample; 12, 15: infected sour cherry samples; 13,14: negative sour cherry and peach samples

Fig. 17.12 DNA fragments amplified by FO1/rO1 group-specific primers in 1 % agarose gel

17.4 Conclusions

The presence of *Ca*. Phytoplasma prunorum in the examined northern Hungarian apricot-growing sites is confirmed by field examinations and laboratory PCR tests. It can be easily seen that the problem is very serious, and *Ca*. Phytoplasma prunorum endangers almost every stone fruit plantation in that area. The disease caused by *Ca*. Phytoplasma prunorum is an increasing and relatively new problem for fruit growers in Hungary, and it seriously threatens the Hungarian apricot cultivation mainly, and other stone fruits as well. The pathogen causes serious destruction of the apricot trees on the examined Hungarian fruit orchards in the Gönc region. The main control methods to apply against the disease: to propagate phytoplasma-free plants and to control vector (*Cacopsylla pruni)*. Our experiences resulting from our investigation show that we have to pay attention to the increasing phytoplasma problem in stone fruits, and have to develop new and effective management strategies.

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