

## Extended Abstract

# Fungal and bacterial diseases on horse chestnut in Norway

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Horse chestnut (*Aesculus hippocastanum*) is mainly grown in gardens, public parks and alleys in Norway. It has been known as a tree with no disease problems, but since 2006, a number of new diseases have been detected (leaf blotch, powdery mildew, anthracnose, and bleeding canker). These new diseases have most likely entered the country by imported horse chestnut transplants. The diseases mentioned here may reduce the aesthetical value of horse chestnut to such an extent that we no longer recommend it for planting in Norway. Fortunately, the insect horse chestnut leaf miner (*Cameraria ohridella*) has not yet been found in Norway.

**Key words:** *Aesculus hippocastanum*, *Guignardia aesculi*, *Erysiphe flexuosa*, *Colletotrichum* spp., *Pseudomonas syringae* pv. *Aesculi*.

## Leaf blotch (*Guignardia aesculi*)

This was found in south eastern Norway in August 2006. Diseased leaves had brown, irregular blotches with a yellow halo (Figure 1), and heavily infected leaves were wrinkled. In the beginning of the last century, *G. aesculi* was the most important disease on horse chestnut in North America, and later it also became widespread in Europe (Pawsey, 1962). Probably the North Sea, which acts as a barrier for natural spread of diseases into most areas of southern Norway, stopped the pathogen from entering the country.

## Powdery mildew (*Erysiphe flexuosa* syn. *Uncinula flexuosa*)

This was discovered in August 2006, while searching for trees with leaf blotch symptoms. Infected leaves had a grey appearance, and chasmothecia were present (Figure 2), but the disease was not widespread at the time. By 2010, horse chestnut in several locations in south eastern Norway had severe powdery mildew

attacks. The pathogen originates from North America and has become widespread in Europe during the last decade (Kiss et al., 2004).

## Anthracnose (*Colletotrichum acutatum* and *C. gloeosporioides*)

This was found in 2006 on horse chestnut leaves. After incubation (room temperature, 100% RH) sporulation became visible along the midrib and veins. *C. acutatum* was most commonly found, but in one case *C. gloeosporioides* was detected on horse chestnut leaves from western Norway (Figure 3, left). Internal transcribed spacer (ITS) sequencing was used to distinguish the two *Colletotrichum* species. Cultures from *C. acutatum* had a pinkish appearance (Figure 3, right), while *C. gloeosporioides* was greyish. *Colletotrichum* spp. are commonly causing anthracnose on woody plants worldwide included on horse chestnut (Sinclair and Lyon, 2005).

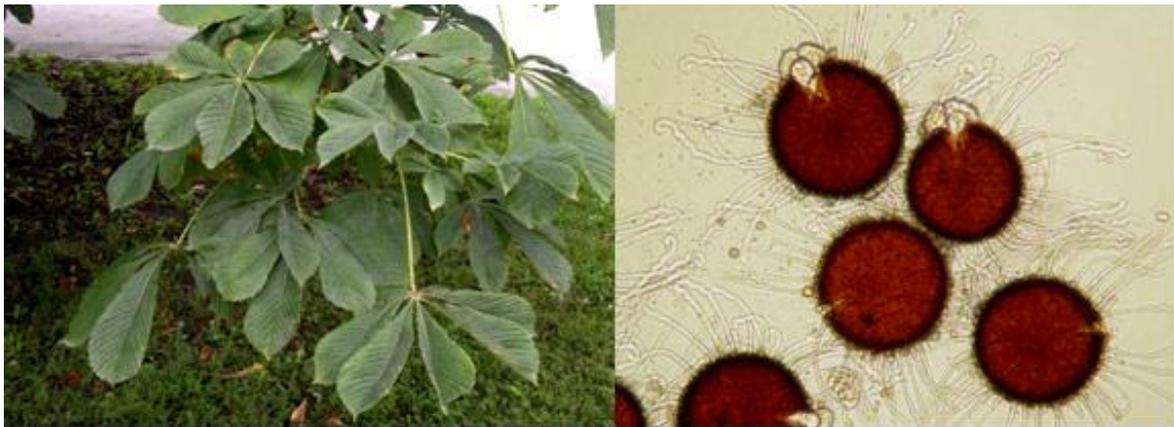
## Bleeding canker (*Pseudomonas syringae* pv. *aesculi*)

This is the latest and most serious of the recently discovered pathogens on horse chestnut in Norway. It

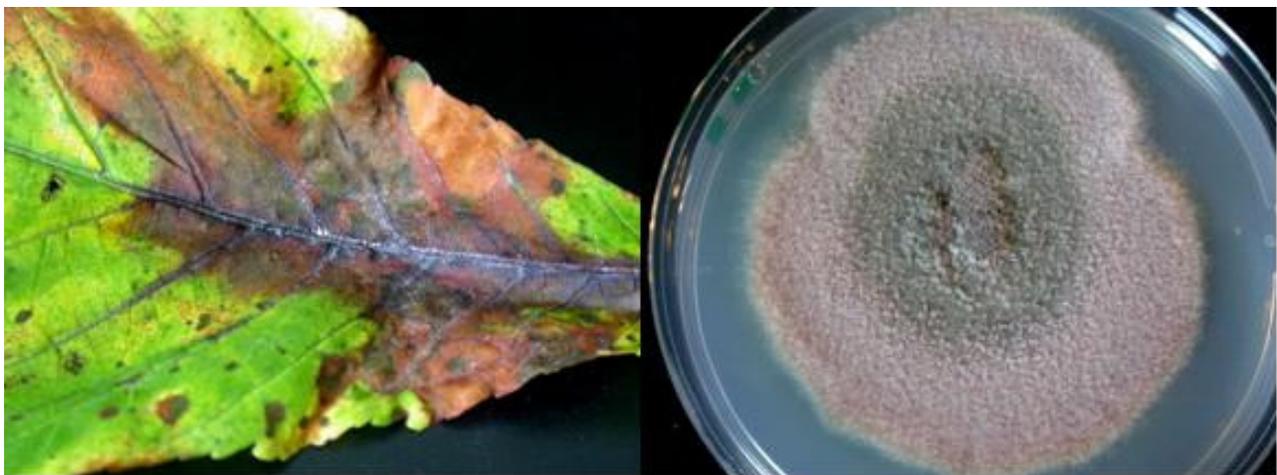
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**Figure 1.** Leaf blotch (*Guignardia aesculi*) symptoms on horse chestnut (*Aesculus hippocastanum*) in south eastern Norway. Photo: Venche Talgø.



**Figure 2.** Powdery mildew (*Erysiphe flexuosa*) makes the leaves appear greyish on horse chestnut (*Aesculus hippocastanum*) (left). Chasmothecia (right) are often present on infected leaves; asci with ascospores emerging from the chasmothecia. Photo: Venche Talgø.



**Figure 3.** Sporulation of *Colletotrichum gloeosporioides* along the midrib and veins on a horse chestnut (*Aesculus hippocastanum*) leaf (left). Culture of *C. acutatum* isolated from horse chestnut (right). Photo: Venche Talgø.



**Figure 4.** Bleeding canker (*Pseudomonas syringae* pv. *aesculi*) on horse chestnut (*Aesculus hippocastanum*). From left to right; dieback symptoms in the crown, bacterial exudates, bleeding canker wounds, and discoloured tissue under the bark. Photo: Venche Talgø.

was detected in south western Norway in June 2010. Diseased trees had dieback symptoms in the crown, bacterial exudates on infected stems, bleeding canker wounds in the bark, and discoloured tissue below infected bark (Figure 4). In Europe, the bacterium was first detected in the Netherlands in 2002 (Dijkshoorn-Dekker, 2005), and has since been found in several European countries.

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