

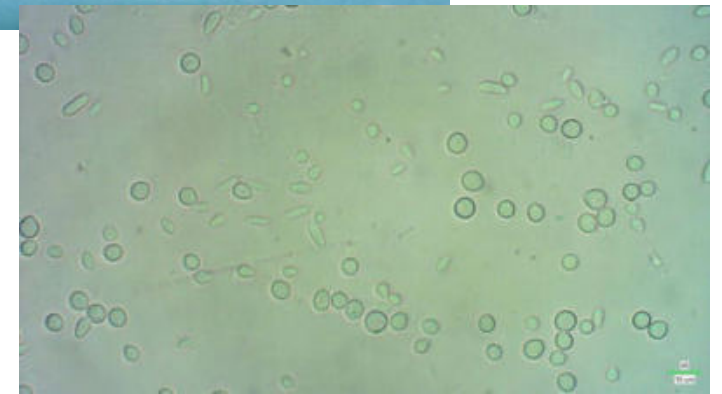
Hippophaë rhamnoides L. - pathogens

▶ Wilting

- ▶ *Fusarium* spp.
- ▶ *F. acuminatum*,
- ▶ *F. oxysporum*,
- ▶ *F. camptoceras*,
- ▶ *F. sporotrichioides*



Wilting symptoms of *Hippophaë rhamnoides* caused by *F. sporotrichioides*



14 - days old colony and microconidia of *F. sporotrichioides* on PDA medium (phot. S. Bienias)

Hippophaë rhamnoides L. - pathogens

Stem and shoot canker, branch dieback of buds and leaves, fruit, root dieback *Hymenopleella hippophaeicola*,

- ▶ *Cytospora* spp.,
- ▶ *Stigmina* sp.
- ▶ *Phomopsis* spp.



(Cotuna i in., 2014, Drevinska
i Moroëko-Biëevska 2022)

Purpose of the research

- The aim of the study was to determine the healthiness of sea buckthorn shrubs in organic cultivation and to identify fungi inhabiting the aboveground organs of the plant

Research material

- ▶ The research was conducted from 2018 on a private sea buckthorn plantation located in Kolonia Czerniejów (51.4147° N 22.7333° E), Jabłonna municipality, Lublin Province,
- ▶ Sea buckthorn bushes in their 2nd year of cultivation, Lithuanian varieties with a small number of thorns.
- ▶ The plantation is situated on a south-eastern slope, surrounded by forests, and cultivated fields. The Czerniejówka and Skrzyniczanka rivers flow near the plantation.
- ▶ The plantation was established in 2017 on an area of 2 ha. The substrate consists of rendzina and sandy loam soil.
- ▶ The plantation is certified as an organic farm.



Sea buckthorn bushes in their second year of cultivation

Results

- Observation of plant health carried out in autumn 2018 indicated dieback of individual shoots and whole plants.
- Mycological analysis, at this date, did not yield fungi of the genus *Verticillium*.
- Numerous cultures of fungi belonging to the genus *Alternaria* were obtained from all organs tested



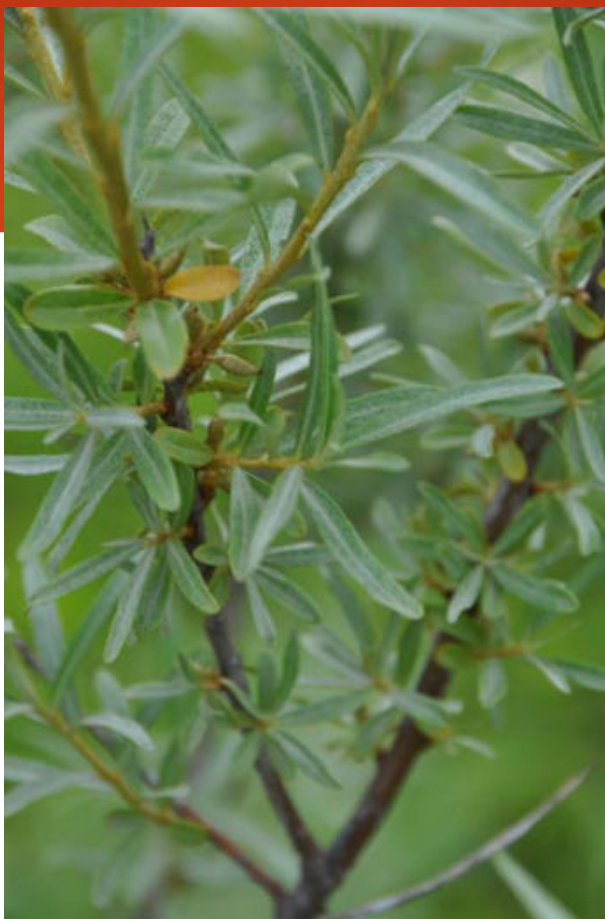
Withering shoots and fruits of sea buckthorn

Results

Fungi obtained from aboveground organs of sea buckthorn on the first survey date - autumn 2018

Species of fungi	Number of isolates			Total (%)
	Leaves	Fruits	Stems	
<i>Alternaria alternata</i> (Fr.) Keissl.	52	4	2	58(21,89%)
<i>Alternaria radicina</i> Meier, Drechsler et E.D. Eddy	48	61	63	172(64,91%)
<i>Chaetomium globosum</i> Kunze			2	2(0,75%)
<i>Coniothyrium</i> spp.			5	5(1,89%)
<i>Epicoccum nigrum</i> Link		2	6	8(3,02%)
<i>Fusarium chlamydosporum</i> Wollenw. Et Reinking		2		2(0,75%)
<i>Fusarium sporotrichioides</i> Sherb.		7		7(2,64%)
<i>Nigrospora oryzae</i> (Berk. et Broome) Petch		2	3	5(1,89%)
<i>Phomopsis</i> spp.		2	2	4(1,51%)
<i>Sclerotinia sclerotiorum</i> (Lib.) de Bary			2	2(0,75%)
Total	100	80	85	265

Results



Sea buckthorn shoots and fruit in the third year of cultivation (Spring – 2019)

Fungi isolated from aboveground organs of sea buckthorn on the second test date - spring 2019

Species of fungi	Number of isolates												Total (%)
	Row I			Row II			Row III			Pooled test			
	L	O	P	L	O	P	L	O	P	L	O	P	
Alternaria alternata (Fr.) Keissl.	24		17		23		1	10	17	7	5	16	120(22,90%)
Alternaria radicina Meier, Drechsler et E.D. Eddy		16		34							8		58(11,07%)
Botrytis cinerea Pers.	2	19	1	4	13				3	8	4	17	71(13,55%)
Cladosporium cladosporioides (Fresen.) G.A. de Vries	15		4	2	2	8	41		4	7	6		89(16,98%)
Epicoccum nigrum Link	2	13	18		6	28	2	18	21	23	9	6	146(27,86%)
Fusarium sporotrichioides Sherb.					2	2		2			2		8(1,53%)
Ilyonectria destructans (Zinssm.) Rossman, L. Lombard et Crous	7				1						7	5	20(3,82%)
Phomopsis spp.									2				2(0,38%)
Saccharomyces spp.			4	4									8(1,53%)
Sclerotinia sclerotiorum (Lib.) de Bary												2	2(0,38%)
Totall	50	48	44	44	47	38	44	30	47	45	41	46	524 (100%)

L – leaves, O – fruits, P - shoots

Results

- Observations of the health of sea buckthorn shrubs in the summer of 2019 showed the presence of shoots with disease symptoms and withering shoots, which accounted for between 2 and 100% depending on the shrub.
- Individual shrubs were found to be dying. Single necrotic spots with a brown border were found on the leaves, and numerous conidial spores of *Alternaria alternata* and *Nigrospora oryzae* were found in a microscope preparation made from such leaves.



Shoots and leaves of sea buckthorn with disease symptoms

Results

- During observation of sea buckthorn fruit health, single mummified fruits were found on the surface of which sporodochia of the fungus *Monilia fructigena* were present.
- The presence of the pathogen was confirmed by mycological analysis.



Healthy fruits of sea burthorn



Mummified fruits of sea burthorn



Conidia of *Monilia fructigena*

Fungi isolated from aboveground organs of sea buckthorn on the third test date - summer 2019

Species of fungi	Number of isolates												Total (%)
	Row I			Row II			Row III			Pooled test			
	L	O	P	L	O	P	L	O	P	L	O	P	
<i>Alternaria alternata</i> (Fr.) Keissl.	41	9	41	50	40	32	30		19	42	29	40	373(68,82%)
<i>Aureobasidium pullulans</i> (de Bary et Löwenthal) G. Arnaud											11		11(2,03%)
<i>Botrytis cinerea</i> Pers.					10	4	20			3	4		41(7,56%)
<i>Chaetomium globosum</i> Kunze									1			4	5(0,92%)
<i>Cladosporium cladosporioides</i> Fresen.) G.A. de Vries						1							1(0,18%)
<i>Colletotrichum gloeosporioides</i> (Penz.) Penz. Et Sacc.									2				2(0,37%)
<i>Epicoccum nigrum</i> Link			1						2				3(0,55%)
<i>Fusarium graminearum</i> Schwabe		9											9(1,66%)
<i>Fusarium sporotrichioides</i> Sherb.									1				1(0,18%)
<i>Monilinia fructigena</i> (Pers.) Honey		21				2		50					73(13,47%)
<i>Nigrospora oryzae</i> (Berk. et Broome) Petch									3				3(0,55%)
<i>Penicillium</i> spp.									2				2(0,37%)
<i>Phomopsis</i> spp.	1	2							9			6	18(3,32%)
Total	42	41	42	50	50	39	50	50	39	45	44	50	542 (100%)

Conclusions

- ▶ 1. The aboveground organs of the sea buckthorn were colonized by numerous species of pathogenic fungi.
- ▶ 2. Numerous isolates of *Monilinia fructigena*, a fungus causing brown rot of the fruit, were obtained from mummified sea buckthorn fruit, resulting in a reduction in the quality and quantity of the yield.
- ▶ 3. The *Alternaria alternata* fungus inhabited all sea-buckthorn organs examined.
- ▶ 4. The occurrence of pathogenic fungi should be regarded as worrying: *Fusarium sporotrichioides*, *Phomopsis* spp. and *Sclerotinia sclerotiorum*. These species are the perpetrators of many dangerous diseases of fruit trees and shrubs.
- ▶ 5. The sea buckthorn shrubs tested were free from fungi with an obligate parasitic mode of action.
- ▶ 6. Due to the high biodiversity of fungi obtained from the examined sea buckthorn organs, further studies on the pathogens of this plant will be continued.

Hippophaë rhamnoides L.

- ▶ The sea buckthorn is still a niche crop, but it is becoming an increasingly valued utilitarian species, especially outside areas of natural occurrence.
- ▶ This is the case, for example, in North America, Ireland, Lithuania (the third crop after apple trees and blackcurrant) and Latvia, and in Poland off the coast, where plantations of the plant are being established.
- ▶ Organic plantations



Hippophaë fructus



Hippophaë rhamnoides L.



Hippophaë rhamnoides L.



Hippophaë rhamnoides L.





Thank you for your attention