

CUSCUTA EPITHYMUM L. (CONVOLVULACEAE), THE MOST WIDESPREAD SPECIES IN SOUTHERN TRANSYLVANIA, ROMANIA

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Abstract

Dodder species affect several thousand hectares in Romania, cutting crops, that is why they became a major economic concern, especially for lucerne, clover, potato, pasture, meadow crops [3]. The impact ranges from moderate loss to severe reduction in plant growth and in some cases, even the death of the host plant, and the severity of the infestation depends largely on the stage of development of the host plants at the initial fixation of the stem [20]. Cuscuta epithymum L. is the most widespread species in the entire analysis, on the territory of the counties Sibiu and Brasov, as well as the parasite on most host plant species. Dodder is a particularly dangerous and harmful quarantine plant, it produces a general disruption of metabolism in the plants they parasite, from which it absorbs organic and inorganic nutrients, weakens and prevents the growth and development of host plants, which leads to their death.

Key words: *Cuscuta epithymum, holoparasitic anthophytes, host plants, polyphagous*

INTRODUCTION

Dodders are counted among the most dangerous quarantine parasitic weeds, not only in Romania, but also in the majority of countries in the warm and temperate climate zones worldwide [33], [34]. They are therefore spread in the southern and central parts of Europe, in South Asia, Northern Africa, the warm and temperate zones of North America and South America, as well as in Australia. Due to their non-abundance to the rules of phytosanitary quarantine, dodders have been spreading on even more surfaces; the seed reserves in the ground thus increasing from year to year. The current distribution of cuscuta in the dynamic landscape can be determined by means of a persistent seed bank [19]. Such species are considered to be harmful and invasive weeds according to the legislation of most countries, having commercial significance with regards to the import/export of seeds/vegetal material that can be susceptible of containing cuscuta seeds; hence their quarantine status [10]; [6]. *Cuscuta spp.* are obligate holoparasitic anthophytes, dependent on suitable hosts for nutrients [20], water and physical support.

Although the names of numerous species suggest that they would be specialized on certain host plants, according to personal observations, that are also confirmed by Meulebrouck [19] (for *Cuscuta epithymum*), cuscuta species are polyphagous; and specialty literature indicates that a high number of cuscuta species can grow on a large variety of host plants, even if they prefer certain ones [1].

MATERIALS AND METHODS

The objective of the work is to send expeditions on the territory of Sibiu AND Brasov county, between May and October each year, for the detection and collection of the dodder. On the occasion of the trips, various cultures, pastures and meadows were tracked, railroad tracks and even the tram line, the roadside, uncultivated land, etc. For each sample, it was noted: the locality, the crop (the host plant species), the degree of attack, the phenotype of the dodder and the date. Samples were harvested and kept under appropriate conditions. The biological material analyzed was in various stages of development, from the first stages to the

fructification phase. In order to determine the host plants and the sowing species, a recent bibliography with current scientific nomenclature has been used.

I mention that other *Cuscuta* species have been noted in the analyzed area, in all species the identification was confirmed by the Romanian researcher Mihai Costea Curator of Herbarium of the Wilfrid Laurier University Biology Department in Waterloo, Ontario, Canada [9]. Specimens sent by us are marked M. Tanase s.n. ("sin numero") and stored as vouchers in the herbarium of the university.

RESULTS AND DISCUSSIONS

Information and documentation to identify areas for the spread of dodder began in 2011 and continued in the years to 2016, in terms of identifying areas of distribution, but also the presence of sowing in fodder perennial crops and grasslands in the area, crops and localities.

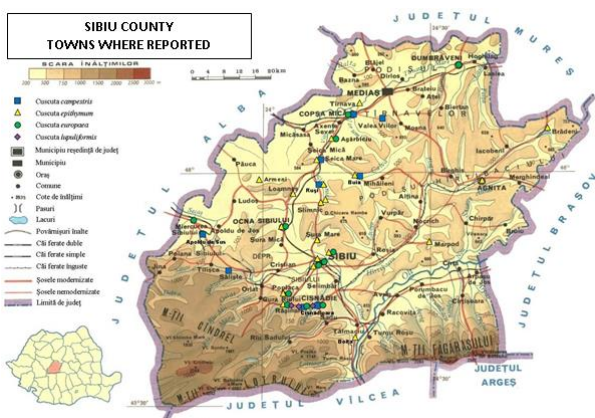


Fig. 1., Sibiu County, locality where reported *Cuscuta*, by us (<http://pe-harta.ro/Sibiu/> - processed)

The analyzed area is actually the agricultural territory belonging to Sibiu and Brasov counties, where field trials were conducted to collect information and plant material, measurements, and reveals.

The crops were analyzed from a phytosanitary point of view, following the presence of the dodder, we have collected statistical data referring to spreading, numerical density at the surface unit, host plant, damage produced. Based on the data, we mapped the localities where the

dodder and the list of host plants were identified.

Table 1. *Cuscuta* spp. in Sibiu County, identified by us

Nr. crt.	LOCALITY	C. campestris	C. epithymum	C. europaea	C. lupuliformis
1.	AGĂRBICIU		▲	■	
2.	AGNITA		▲		
3.	APOLDU DE SUS	▼			
4.	ARMENI		▲		
5.	BOIȚA		▲		
6.	BRĂDENI		▲		
7.	BUIA	▼	▲		
8.	CISNĂDIE	▼		■	■
9.	CISNĂDIOARA	▼		■	■
10.	COPȘA MICĂ	▼		■	
11.	CRISTIAN				
12.	DUMBRAVA SIBIULUI		▲		
13.	DUMBRĂVENI			■	
14.	HAMBA		▲		
15.	MARPOD		▲		
16.	LOAMNEȘ		▲		
17.	MIERCUREA SIBIULUI			■	
18.	OCNA SIBIULUI		▲	■	
19.	POPLACA		▲	■	
20.	RĂȘINARI		▲	■	■
21.	RUȘI	▼	▲		
22.	SĂLIȘTE	▼			
23.	SIBIU		▲	■	
24.	SLIMNIC		▲		
25.	ȘECA MARE	▼	▲		
26.	ȘURA MARE		▲		
27.	TÂRNAVA		▲		
28.	TURNIȘOR			■	
29.	VIILE SIBIULUI	▼	▲	■	

Source: Original.



Fig. 2. Brasov County, locality where reported *Cuscuta*, by us (<http://pe-harta.ro/Brasov/> processed)

Table 2. *Cuscuta spp.* in Braşov County identified by us

Nr. crt.	LOCALITY	<i>C. campestris</i>	<i>C. epithymum</i>	<i>C. europaea</i>
1.	RĂŞNOV			■
2.	BRAŞOV			■
3.	CAŢA			■
4.	VIŞTEA DE SUS		♣	
5.	BRAŞOV	▼		
6.	BRAŞOV			■
7.	STUPINI BV.			■
8.	STUPINI		♣	
9.	CAŢA		♣	
10.	UCEA		♣	
11.	VIŞTEA			
12.	DRAGUŞ ŞI OLTEŢ		♣	
13.	MESCHENDORF			■
14.	BUNEŞTI		♣	
15.	VLĂDENI	▼		
16.	CRISTIAN			■
17.	VULCAN			■
18.	MAIERUŞ		♣	
19.	HĂLCHIU		♣	
20.	CODLEA			■
21.	MĂNDRA		♣	
22.	BRAŞOV	▼		
23.	MĂGURELE		♣	
24.	ŞERCAIA		♣	
25.	VOILA		♣	
26.	SĂMBATA DE JOS		♣	

Source: Original.

Dodders are counted among the most dangerous quarantine parasitic weeds, not only in Romania, but also in the majority of countries in the warm and temperate climate zones worldwide [33]; [34]. They are therefore spread in the southern and central parts of Europe, in South Asia, Northern Africa, the warm and temperate zones of North America and South America, as well as in Australia. Due to their non-abundance to the rules of phytosanitary quarantine, dodders have been spreading on even more surfaces; the seed reserves in the ground thus increasing from year to year.

The current distribution of *Cuscuta* in the dynamic landscape can be determined by means of a persistent seed bank [19]. Such species are considered to be harmful and invasive weeds according to the legislation of most countries, having commercial significance with regards to the import/export of seeds/vegetal material that can be

susceptible of containing *Cuscuta* seeds; hence their quarantine status [10]; [6].

Table 3. Host plants for *Cuscuta epithymum* identified by us

Nr. crt.	Host plants species	Botanic family
1.	<i>Agropyron repens</i>	Poaceae
2.	<i>Avena sativa</i>	Poaceae
3.	<i>Centaurea nigrescens</i>	Asteraceae
4.	<i>Chrysanthemum leucanthemum</i>	Asteraceae
5.	<i>Coronilla varia</i>	Fabaceae
6.	<i>Cruciata glabra</i>	Rubiaceae
7.	<i>Cytisus nigricans</i>	Fabaceae
8.	<i>Dactylis glomerata</i>	Poaceae
9.	<i>Euphorbia cyparissias</i>	Euphorbiaceae
10.	<i>Fagopyrum convolvulus</i>	Polygonaceae
11.	<i>Festuca rubra</i>	Poaceae
12.	<i>Festuca rupicola</i>	Poaceae
13.	<i>Galium rubioides</i>	Rubiaceae
14.	<i>Gallium palustre</i>	Rubiaceae
15.	<i>Gallium verum</i>	Rubiaceae
16.	<i>Hypericum perforatum</i>	Hypericaceae
17.	<i>Leontodon autumnalis</i>	Asteraceae
18.	<i>Linaria vulgaris</i>	Scrophulariaceae
19.	<i>Lotus corniculatus</i>	Fabaceae
20.	<i>Mentha arvensis</i>	Lamiaceae
21.	<i>Onobrychis viciifolia</i>	Fabaceae
22.	<i>Pimpinella saxifraga</i>	Apiaceae
23.	<i>Plantago lanceolata</i>	Plantaginaceae
24.	<i>Rhinanthus serotinus</i>	Scrophulariaceae
25.	<i>Sonchus arvensis</i>	Asteraceae
26.	<i>Taraxacum officinale</i>	Asteraceae
27.	<i>Tenerium chamaedrys</i>	Lamiaceae
28.	<i>Vicia cracca</i>	Fabaceae

Source: Original.

Leguminous plants (Fabaceae) are more frequently chosen as host plants, maybe also due to the fact that they are capable of fixating atmospheric azote, thus being more nutritious [30].

Except for the preferred cultures of perennial leguminous fodders, *Cuscuta* also parasitizes numerous vegetable plants [26], textile plants, industrial plants and ruderal species. Also, it can survive on wood essences, such as willow, acacia, poplar and blackberry [23]. In literature there is also reference to the parasitism of the species of pine and birch trees (*Pinus sylvestris* and *Betula pendula*) by *C. epithymum*, but only the trees' seedlings [19].

Cuscuta facilitates the transmission of certain viruses onto trifolieae, the viral chlorosis of the sugar beet, potato viruses but also diseases such as microplasmoses [5]; [21]; [8]; Credi,

1992; [14]; [22]. The most important types of ecosystems affected by cuscuta species are the pratological ecosystems, but a high number of other species also function as host plants for dodders; fact which influences the biodiversity of ecosystems, thus having repercussions upon human society and animal health. Agricultural crop losses are substantial, from both a quantitative and a qualitative point of view [11]; [31], the fatty acids in fodders representing an important parameter regarding their quality [31]; [15]; [16].

There have been relatively few studies on the impact of natural plant communities, but in general it goes without saying that biodiversity is reduced in those zones attacked by cuscuta [13]; [18]; [17]; [24]; [25]. Certainly, one needs to take into consideration the fact that most parasitic species have negative consequences on agriculture, influencing the output quantity, quality and price [27]; [29].

CONCLUSIONS

Cuscuta spp. are obligate holoparasitic anthophytes, dependent on suitable hosts for nutrients, water and physical support. Although the names of numerous species suggest that they would be specialized on certain host plants, according to personal observations [31], that are also confirmed by Meulebrouck, 2009 (for *C. Epithymum*), *Cuscuta* species are polyphagous (Table 3); and specialty literature indicates that a high number of cuscuta species can grow on a large variety of host plants, even if they prefer certain ones [1].

In Romania in recent years have multiplied considerably the number of hectares of non worked agricultural land. It has been multiplied by a huge number of annual and perennial weeds, producing significant damage to crops, due to the fact that they are a permanent source of weeds, but also a source of pests and diseases difficult to control.

Although it parasitizes a large number of plants [6], significant are mainly the damages done to perennial leguminous fodder crops: alfalfa, clover, sainfoin, fingers-and-thumbs,

as well as mixes of croplands and natural grasslands [3]; [12]. Due to its non-abidance to the rules of phytosanitary quarantine, dodders have been spreading on even more surfaces; the seed reserves in the ground thus increasing on a yearly basis. In addition to the damages caused to the cultures of perennial leguminous fodders, dodders can also be often found in grasslands and meadows [7]; [32], [28], having a negative impact on the decorative and touristic aspect of the landscape due to their invasion [4]; [2], Bardgett et al., 2006).

The most widespread of the 4 species of dodder identified are: *Cuscuta epithymum*, in 13 localities - Brasov county and 20 localities - Sibiu county, in the analyzed area.

According to the results of our research, there is no leguminous fodder that is not attacked by cuscuta clusters [31].

Also, we have noticed its presence on grasses, although according to the specialty literature on cuscuta, grasses are theoretically not parasitized by cuscuta.

However, during our field inspections on grasslands, cuscuta was detected on the following species, belonging to the Poaceae family: *Agropyron repens*, *Briza media*, *Dactylis glomerata*, *Festuca pratensis*, *Festuca rubra*, *Festuca rupicola*, but also on *Triticum aestivum*, as a ruderal plant [31]. we mention that many host plants of C are detected by us and are not quoted in the literature

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