THE IMPACT OF DODDER ON THE BIODIVERSITY OF PRATO-ECOSYSTEMS

IMPACTUL CUSCUTEI ASUPRA BIODIVERSITATII PRATOECOSISTEMELOR

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Abstract: *Parasitic flowering plants cause significant dangers with regard to crops; and the developing countries cannot cope with the economic losses they induce to agriculture. The Cuscuta species become agricultural pests when susceptible crops are introduced into their habitats. With the extension of crops into such areas, large populations of Cuscuta have been developed, thus injuring and even killing their host crops. There are numerous dicotyledonous weeds which serve as hosts for Cuscuta, and even Poaceae.*

Key words: *Cuscuta sp,. host plants, quarantine parasite*

INTRODUCTION

In the Sibiu district *Cuscuta* (dodder) represents a major weed problem regarding agricultural production; parasitism by Cuscuta suppresses the crops and reduces yield. The large populations of Cuscuta have developed substantially; fact which damages and sometimes even kills the crop hosts. Such plants can support Cuscuta on road-sides, field borders, and other non-cropped areas, as well as within fields of non-host crops. Weedy hosts have many significant economic effects. They can perpetuate and even amplify the reservoir of Cuscuta seed in soil during years when non-host crops are grown. Furthermore, they also serve as a first attachment site for Cuscuta seedlings.

The dodder raises many problems and produces damages on several types of crops on the entire surface of the Sibiu county. According to recent research results (2008 - 2011), grasslands and perennial leguminous forages are highly infested by *Cuscuta,* recording a frequency and an attack degree of between 10-80%, thus destroying the crop and determining an even more intense dissemination of this parasite.

Similarly to other parasitical plants (such as *Rhinanthus,* Ameloot et al, 2006.; Bardgett et al, 2006), the Cuscuta species play an important role in ecosystems. They have the capacity of reducing the biomass and of modifying the structure of plant communities in a significant manner (Pennings şi Callaway, 2002).

In view of the research carried out, one might assert that almost 20% of the cultivated surface is affected by Cuscuta, thus causing an annual loss of over 20 million RON, not to mention the losses registered in seed-tree cultures (Dragomir, 2005).

Cuscuta disseminates to a large extent by means of its seeds, which are extremely numerous and small, and which keep the germination in deposits over a period of between 10-12 years, or even up to 40 years (FNAMS, 1995), and in the ground or in stable garbage for up to 5-6 years. It also dissiminates by means of filaments or segments of filaments, which are vegetative forms of this plant and which can be spread by means of animals or people walking in the grasslands and in the infected crops. But significant is primarily the damage caused on perennial leguminous forges, such as alfalfa, clover, cockshead, bird's foot trefoil and mixtures of disseminated grasslands and natural meadows. Dodder has also been discovered on Gramineae (Poaceae) in meadows, etc., although according to the literature on this field, the Gramineae cannot be parasitized since their conductive vessels are protected by a sclerenchym layer. Anyway, such plants can support *Cuscuta* on road-sides, field borders and other non-cropped areas, as well as within fields of non-host crops.

The dodder represents one of the most dangerous quarantine parasite weeds, not only in our country, but also in most of the countries with a warm or temperate climate (Chevalier, 1948).

Cuscuta is also often found in meadows and hayfields, where – beside the damage it produces – it also has a negative influence on the decorative and touristic aspect of the landscape (I. Bobeş, 1983).

MATERIAL AND METHODS

In order to attain the objective of our research, several expeditions on the territory were required within the period April – October on an annual basis between 2008 and 2011.

We have considered different grasslands, and for each of them we took notes on: the locality, the host plant, the degree of attack, the species of *Cuscuta*, as well as on the phonological phase of both *Cuscuta* and its host plant.

The obtained data was verified on numerous types of grassland for several years in a row. In order to identify the *Cuscuta* species, blossoms and inflorescences have been the only taxonomic variables regarded and evaluated. Seven parasite species have been found on numerous host plants, as shown in the table below.

RESULTS AND DISCUSSION

According to the results of the recent research (2008-2011), many cultures are high intoxicated; and this parasite is still expanding. After analyzing the numerous samples gathered during the scientific rips, it can be mentioned that on the territory of the Sibiu county there are many Cuscuta species that parasitize on a very broad range of host plants. The favorite host plants are, as far as known, the perennial leguminous forages, but Cuscuta is also to be found on vegetables, weeds and even Gramineae (Poaceae).

According to the research carried out, Table 1 synthesizes the main results regarding the dodder in the Sibiu county, showing which *Cuscuta* species have been found on which leguminous host plants types, resp. Gramineae.

There are several characteristics which explain the weed's adaptation to parasitism, such as: a great fertility (up to 10,000 seeds per plant); a long period of subsistence for the search of host plants; an echeloned generative of long duration, due to the phenomenon of tegumentary inhibition; the living haustoria' resistance inside the host plant while the parasite's stems are dead; haustoria which can regenerate the parasite plant, thus becoming perennial.

Given its toxicity aspect, this weed is very dangerous, since it consists of substances which are pernicious to animals‘ health, thus depreciating the fodders‘ quality (Kingsbury , 1964).

Having both an internal and an external quarantine status, which unfortunately has not been abided by, *Cuscuta* has become a national flagellum for our country, having major practical and economic consequences, especially on leguminous forages cultures, as well as on meadows and hayfields.

Cuscuta, a quarantine parasite plant, produces major damage on certain leguminous forages cultures, as well as grasslands and hayfields, recording a frequency and an attack degree of between 10-80%, thus destroying the whole crop on certain areas. Once dodders have occurred, rebuttal measures need to be taken, otherwise the weed would overbreed extremely quickly; and while it disseminates, host-plants parch and die, the production of cultivated plants thus being reduced by up to 90% or even 100% (Hălălău and al., 1980).

The restriction of dissemination and the rebuttal of the dodder represent the top priority objectives of the researches on *Cuscuta.*

Table 1

Host plants for *Cuscuta* species

No	Host plants	Botanical family	Cuscuta species
1	*Agropyron repens*	Poaceae	*Cuscuta epithymum, C. monogyna, C. trifolii*
2	*Apera spica-venti*	Poaceae	*C. trifolii*
3	*Arrenatherum elatius*	Poaceae	*C. trifolii*
4	*Avena sativa*	Poaceae	*C. epithymum*
5	*Briza media*	Poaceae	*C. trifolii*
6	*Calamagrostis arundinacea*	Poaceae	*C. trifolii*
7	*Coronilla varia*	Fabaceae	*C. epithymum*
8	*Dactylis glomerata*	Poaceae	*C. epithymum*
9	*Echinochloa crus-galli*	Poaceae	*C. lupuliformis*
10	*Festuca rupicola*	Poaceae	*C. epithymum*
11	*Lotus corniculatus*	Fabaceae	*C. epithymum*
12	*Medicago falcata*	Fabaceae	*C. lupuliformis, C. monogyna*
13	*Medicago sativa*	Fabaceae	*C. europea, C. monogyna*
14	*Onobrychis viciifolia*	Fabaceae	*C. epithymum*
15	*Trisetum flavescens*	Poaceae	*C. trifolii*
16	*Vicia cracca*	Fabaceae	*C. epithymum, C. trifolii*

CONCLUSIONS

After analysing the numerous samples collected during the incursions organized in the Sibiu county between 2008 and 2011, one can assert that on the area of the Sibiu county there are several species of Cuscuta, which parasitize a wide range of host-plants (Tanase 2001). The host-plants preferred by the dodder are mainly perennial leguminous forages. However, *Cuscuta* is also found on vegetable crops, on different types of weeds, as well as on the Gramineae in grasslands and hayfields (Tanase, 1999). They have the capacity of reducing the biomass and of modifying the plants community structure in a significant way.

In addition to this, I would like to mention a further aspect, which will definitely be given a lot of attention in the near future, namely the approach to Cuscuta from the point of view of biodiversity. While approximately half of the *Cuscuta* species may require conservation measures, the genus as a whole is sometimes posted on governmental lists of noxious or quarantine weeds. In 1997 the 'red list' of threatened species has included 22 Cuscuta species worldwide, but this list has not been reevaluated with regard to more recent criteria (IUCN, 2007) and NatureServe (2009), so it seems that more species would be in need of conservation.

Despite their ecological significance, parasitic plants face more conservation challenges than autotrophic plants. This is especially valid for the groups that include weedy or invasive species such as *Cuscuta*. For this reason, the traditional focus on parasites and control methods should be enriched by some research from the point of view of biodiversity. Certainly, one must not neglect the fact that most of these parasitic species have negative consequences on agriculture. Nevertheless, an ecologic approach to these plants will decrease those inequalities concerning the conservation of biodiversity, and create some of those fundaments which are still called in question by contemporary policies (Costea et al. 2009).

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