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ANTS (HYMENOPTERA: FORMICIDAE) AS PRIMARY PESTS IN HUNGARY: RECENT OBSERVATIONS

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Abstract. During the period between 1994 and 2001 considerable ant damages were observed in several fields, horticultural and medicinal crops in county Tolna, southern Hungary. Ants generally attacked young plants, foraging and thinning their root collars, therefore the plants fell off and then dried. They foraged skin of fruit crops and grapes and consumed fruit flesh, too. In public parks and nurseries of Budapest ants provoked lobed leaves on ornamental shrubs and trees. Majority of ants collected from damaged plants were *Tetramorium caespitum* and *Lasius* spp. In apples *Camponotus* spp. also occurred, while from grapes a Mediterranean species, *Prenolepis nitens* was identified.

Key words: ants (Formicidae), damage, crops, Hungary

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Introduction

Damages caused by ants in Hungary have been recorded already from the 19th century. Anonymous investigators (Anonym 1891, 1892, 1894, 1895) recorded *Formica rufa* Linnaeus 1758. on conifer seedlings with foraged roots, *Tetramorium caespitum* (Linnaeus 1758) feeding on greener parts of dwarf apple trees, ants of unknown species in peaches and early season grapes and attributed damages on Scotch pine and black pine to *Lasius flavus* (Fabricius 1793) and *T. caespitum*. Győrffy (1939) and Csapó (1940) reported damages on plantlets and maize, respectively without mentioning the species, but Nagy (1952) observed *T. caespitum* foraging in seeded poplars.

From the middle of the 1990s, Vörös (1995), Vályi and Vörös (1997), Vörös and Takács (1996), Vörös and Gallé (1996, 1998, 2001) and Tartally (2000) have reported on the primary damages caused by ants in various crops.

In this paper we give a brief outline of ant damages recently recorded in Hungary.

Material and methods

The waste majority of the surveys were made in county Tolna in southern Hungary (Table 1), where the predominant soil type is loess.

Losses were recorded during a thorough inspection of the fields, determining target foraging areas of ants. We sought for damages caused by ants moving or eventually feeding on the plants in every case and made sure of their primacy.

During the surveys we collected as many damaging ant individuals from the affected plants and soil as we could. Little spades, jars of different sizes (1 and 5 litres) and an aspirator were used for collection, the ants were placed in the jars together with the soil and plants.

In the laboratory the ants were sorted from the samples using a brush and placed into Eppendorf-tubes containing 75 % alcohol, with an indication of date, time, name of the host plant and other relevant data. Ants were identified under stereo microscope at the laboratory of the Department of Ecology, University of Szeged. We unified the species list based on the works of Somfai (1959) and Gallé *et al.* (1998).

Table 1. Sites and dates of the ant damage observations

Site	County	Date	Demigod plant	Note
Fadd	Tolna	May 1994	sunflower	
Felsőnána	Tolna	May 1996	maize	
Felsőnána	Tolna	May 1996	sunflower	6-19 leave stage
Szedres	Tolna	May 1996	melon	greenhouse
Szedres	Tolna	May 1996	watermelon	greenhouse
Szekszárd	Tolna	May 1996	cabbage	
Szekszárd	Tolna	May 1996	grapes	'Kékfrankos' type
Tolna	Tolna	May 1996	melon	
Fácánkert	Tolna	May 1996	melon	
Dalmand	Tolna	Oct. 1996	winter rape	
Dalmand	Tolna	May 1997	mustard	82 ha
Mözs	Tolna	May 1997	cabbage	
Fácánkert	Tolna	June 1997	watermelon	
Szedres	Tolna	May 1998	watermelon	
Szekszárd	Tolna	May 1998	strawberry	
Miszla	Tolna	May 1998	maize	100 ha
Szekszárd	Tolna	May 1998	carrot	
Kölesd	Tolna	May 1999	mustard	20 ha
Sióagárd	Tolna	May 1999	watermelon	small garden
Sióagárd	Tolna	Sept. 1999	grapes	40 ha
Siófok	Somogy	May 1999	sunflower	100 ha
Görgeteg-Lábod	Somogy	May 1999	sunflower	95 ha
Gödöllő	Pest	May 1999	melon	
Budapest	Pest	May 1999	peach plum	
Budapest	Pest	May 1999	plum	
Budapest	Pest	1999	ornamental trees & shrubs	
Tevel	Tolna	May 2000	poppy	
Tolnanémeti	Tolna	June 2000	cabbage	2 ha
Gyönk	Tolna	June 2000	maize	16 ha
Szekszárd	Tolna	June 2000	sour & sweet cherry	
Mórágy	Tolna	Sept. 2000	apple	
Szekszárd	Tolna	Oct. 2000	walnuts	
Kajdacs	Tolna	May 2001	thyme	0.15 ha
Pusztaegres	Tolna	May 2001	maize	6 ha
Jászberény	Jász-Nagykun-Szolnok	June 2001	melon	
Cserszeg	Zala	Aug. 2001	grapes & apple	

Results

The observed ant species at crops

The following ant species were found at the damaged plants (in alphabetic order): *Camponotus fallax* (Nylander, 1850); *Camponotus vagus* (Scopoli, 1763); *Formica rufibarbis* Fabricius, 1793; *Lasius alienus* (Foerster, 1850); *Lasius emarginatus* (Olivier, 1791); *Lasius neglectus* Van Loon, Boomsmsa & Andrásfalvy, 1990; *Lasius niger* (Linnaeus, 1758); *Lasius paralienus* Seifert, 1992; *Lasius plathytorax* Seifert, 1992; *Lasius psammophilus* Seifert, 1992; *Prenolepis nitens* (Mayr, 1852); *Solenopsis fugax* (Latreille, 1798) and *Tetramorium caespitum* (Linnaeus, 1758). Besides ants, the ant imitating beetle, *Formicomus pedestris* Rossi also occurred together with ants and presumably caused similar damage.

Case descriptions of ant damages on various crops

In spring 1994, instead of the “expected” wireworm damages, ant foraging was found in sunflowers. The ants concentrically overran the lower petioles of plants at 2-6 leaf stage and foraged sapful parts. In certain, most endangered sites 30 % of the

plants died. Lower leaves of the attacked but survived sunflower plants, rolling inwards dried down at their petioles. In 1995 at Felsőnána ants attacked sunflower plants of higher developmental stages, and hollowed stems below the inflorescence initiations, provoking drying of upper plant parts, which turned brown. All the ants observed on sunflower belonged to *T. caespitum* (Table 2).

In potted melons, covered with plastic flat foil we saw plants hollowed around the hypocotyl and root collar, holed and passed by foraging trails. 20-40 ants were found per plant, completely killing plantlets. In 1996, 1998 and 2001 we found similar symptoms on melons. In winter rapes we observed that the plants wilted, fell off and finally dried out due to thinning and foraging of root collars of plants at 2-4 leaf stage. In melon, besides *T. caespitum*, a beetle species, namely *Formicocomus pedestris* also caused damage (Table 2). In 1997, in transplanted watermelons ants invaded the container pots and foraged root collars. A lot of ant nests were found in the soil, the area was overrun by workers of *T. caespitum*.

In 1995, ants attacked the cabbage plantlets. Plants fell down due to the thinned root collars then dried. Losses were so significant that cabbages had to be replanted. In 1997, falling down and withering seeded cabbage of 2-leaf stage and a plenty of *T. caespitum* ant-hills were observed.

In September of 1995 ants hurt berry skin of 'Kékfrankos' grapes and consumed fruit sap. About 5-10 ants were feeding in a berry but the damage was insignificant. In 1999, intensive ant movement was observed on grapevine plants, 8-10 ants were found on each bunch at a time. Berry skin and seeds were uninjured as ants consumed only fruit flesh. In contrary to the former cases, we observed several ant species on grapes (Table 2).

In 1997 a white mustard stand showed conspicuously deficient crop stand, as the ants foraged hypocotyls of seedlings. Larger and smaller heaps indicated the entrance of high density ant nests. In 1999 ants consumed 2-4-leaf plants of white mustard in spots. At white mustard besides *T. caespitum*, *Lasius paralienus* and the beetle, *F. pedestris* also occurred.

In 1998, in strawberries characteristic heaps on the soil and swarming workers appeared in the centre of the plants, provoking thinning and drying of the plants. In carrots we observed tiny foraging on the upper part of the roots.

In maize, ants invaded root collars and fed on them leaving only the fibres. Damages occurred sporadically in spots. Killing of plants reached 30-40 % in certain foci, leading to an average deficiency of 5-20 % in the crop stand in 1998. In 2000, at the 2-4 leaf stage, the lower leaves began drying and caused a slightly deficient crop stand (less than 10 %). Similar damages were observed on maize in 2001, too.

In Budapest and its vicinity ants spoiled market value of peaches and plums by feeding on ripen fruits in 1999. In 2000, ants were recorded foraging ripen sweet and sour cherries on the trees. They made some very tiny or a single, bigger round hole in the fruit flesh and consumed the inner parts. More and more fruits of sound epidermis were attacked probably because of the draught and heat. Among others, large carpenter ants (*Camponotus vagus*), foraging the epidermis, hollowed fruit flesh of apples. *T. caespitum* in walnut kernels fed on sound kernel parts and covered them with gnawn fruit (without excrement!).

During the warm and arid periods in summer of 1999, similarly to leaf-cutting ants in tropic areas, they caused leaf lobes in public parks and nurseries on Japanese quince, rock cotoneaster**,** creeping cotoneaster and silver lime, and ant workers moved to their nests with the cut leaf pieces.

The only damage by *Solenopsis fugax* was observed in 2000. We found this tiny, yellowish ant in poppies, foraging holes and trails in roots and devastating the plants.

In 2001 ants foraged stem base of thyme plants; the crop died in spots, especially where a building overshadowed the surface.

Discussion

A wide range of ant-plant interactions has been published (cf. Huxley and Cutler 1991), but the documented ant damages are mainly restricted to harvester and leaf-cutting ants. In some cases, however, the role of ants as pest insects is overemphasised and although we cannot give the same answer to Robinson's (1999) question: ("What's the top pest? Ants are the answer") in Hungary, the above described cases indicate that the damages caused by the ants cannot be neglected. Whereas Cherix and Bijleveld (1994) regarded the introduced species as the main pests in Europe, in this case the majority of the damage-causing species are native in Hungary. Out of the 13 ant species observed at crops, *T. caespitum* proved to be the most dangerous pest. Some *Lasius* species were also significant. Other species occurred only sporadically and their damage, if any, was local (e.g. *Prenolepis nitens, Formica rufibarbis*) or insignificant (e.g. *Campontous fallax*), therefore they cannot be regarded as widespread agricultural pests.

Table 2. Damages by ant species in different crops in 1994-2000. *ant-imitating beetle Heteromera, Anthicidae

Plants	Ant species	Year of damage
sunflowers	*Tetramorium caespitum*	1994, 1995, 1996, 1998, 1999
maize	*T. caespitum*	1995, 1997, 1998, 1999, 2000, 2001
winter rapes	*T. caespitum* *Formica rufibarbis*	1996, 1998 1996
white mustard	*T. caespitum* *Lasius paralienus* *Formicomus pedestris**	1997 1999 1999
poppies	*Solenopsis fugax.*	2000
watermelons	*T. caespitum* *Lasius niger* *L. paralienus*	1995, 1996, 1997, 1998, 1999, 2001 1995 1998
melons	*T. caespitum* *F. pedestris**	1995, 1996, 1997 1995, 1997
cabbage	*T. caespitum*	1996, 1997, 2000
grapes	*Prenolepis nitens* *L. paralienus* *T. caespitum* *Lasius emarginatus*	1995, 1997 1999 2001 2001
apples	*Camponotus vagus* *Camponotus fallax* *T. caespitum*	2000 2001 2001
peaches	*L. psammophilus*	1998
sweet cherries	*Lasius alienus*	2000
sour-cherries	*T. caespitum* *L. alienus*	2000 2000
plums	*L. alienus,* *L. niger*	1998 1998
walnuts	*T. caespitum*	2000
Japanese quince	*L. plathytorax* *L. niger*	1999 1999
rock cotoneaster,	*L. plathytorax* *L. niger*	1999 1999
creeping cotoneaster	*L. plathytorax* *L. niger*	1999 1999
silver lime	*Lasius neglectus* *Lasius niger*	1999 1999
thyme	*T. caespitum*	2001

In the myrmecological literature there are very few recent data on similar ant damages as described here from temperate regions (cf. Cherix and Williams 1994, Williams 1994). Besides the classical Hungarian papers cited in the introduction, Hutson (1933) published the root eating ants as pests of garden plants. Myburgh *et al.* (1973) described the ants as pests of deciduous fruit, grapes and miscellaneous other horticultural crops in South Africa. Whereas this work dealt with such species as *Crematogaster* and *Iridomyrmex* spp., several papers discuss the damage caused by the carpenter ants and their control (e.g. Hansen and Akre 1994, Gooch 1999, Suiter and Bennett 1999, Drlik and Quarles 2000). There is an extensive literature on the control of other ant species or ants in general (e.g. Suiter *et al.* 1997, Tucker 1998, Katz 1999a, 1999b, Varjas *et al.* 1999).

Reimer *et al.* (1990) emphasise the significance of urban ant pests in the Hawaiian islands. In the present paper, the urbanised species were found in Budapest, damaging ornamental plants. The role of Lasius neglectus, a recently describe ant species from Budapest is crucial in this case (cf. Boomsma *et al.* 1990, Tartally 2000).

We observed heavy ant damages on maize fields in Hungary. Dejean *et al.* (2000) found interrelationships between the distribution of ants and the maize damages.

In our opinion, groundwater level, lowering due to the dry and mild winters and springs, as well as the hot summers of the past few years (especially in 1995

and 1996) have led to the drastic decrease of moisture necessary for ants, therefore they took up the necessary water from crop plants.

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