WINTERING CHARACTERISTIC OF THE MELIGETHES SPECIES IN HUNGARY
A MELIGETHES FAJOK TELELÉSI SAJÁTOSSÁGAI MAGYARORSZÁGON

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ABSTRACT

The pollen beetle is one of the most important pests of the rape fields in Hungary. Profound knowledge in the biology and ecology of it is required to make the plant protection treatments more efficient. A study was carried out in 2002 with an objective to explore the possible differences among the various species of genus Meligethes in their overwintering customs. During my research of overwintering I studied places with different conditions. Leaf samples which fell to the ground were collected to establish the most preferable type of wintering layer. Then the samples were placed in separator bags, which made it possible to observe the emergence of the beetles in early spring. My results show that four species were found in the samples: Meligethes aeneus Fabricius, 1775, Meligethes coracinus Sturm, 1845, Meligethes viridescens Fabricius, 1787 and Meligethes picipes Sturm, 1845.

I did not find decisive differences on how these species select their wintering places, yet there was a main divergence in the period of time in their emergence. It was discovered that Meligethes aeneus preceded the three other related species.

KEYWORDS: oilseed rape, Meligethes species, overwintering, wintering place, leaf-litter sample

ÖSSZEFOGLALÁS

Magyarországon a repce tavaszi kártevői között az egyik legfontosabb a repcefénybogár. Biológiájának és ökológiájának behatóbb ismerete hozzájárul az ellene való hatékonyabb védekezéshez. 2002-ben elvégzett megfigyeléseim célja a Meligethes fajok áttelelése közötti esetleges különbségek feltárása volt. Vizsgálataim során eltérő adottságú telelési helyeket vizsgáltam. Avarmintákat gyűjtve megállapítottam, hogy melyek a leginkább preferált telelési helyek. Ezt követően a begyűjtött mintákat zsákos futtatókba helyeztem és figyeltem a fajok tavaszi előjövetelét. Eredményeim szerint a Meligethes aeneus Fabricius, 1775, a Meligethes coracinus Sturm, 1845, a Meligethes viridescens Fabricius, 1787 és a Meligethes picipes Sturm, 1845 fajok fordultak elő a mintákban. Az áttelelő hely kiválasztásában döntő különbséget nem találtam a fajok között, azonban a telelési helyről való előjövetel időpontjában igen, a Meligethes aeneus időben megelőzte a másik három rokon fajt.

KULCSSZAVAK: repce, Meligethes fajok, áttelelés, telelőhely, avarminta

RÉSZLETES ÖSSZEFOGLALÁS

A növényvédelemmel foglalkozó szakemberek a repcén talált fénybogarakat Meligethes aeneus-ként kezelik, holott azzal egyidejűleg más Meligethes fajok is előfordulhatnak és károsíthatnak. A repcén előforduló Meligethes fajoknak évente egy nemzedéke van, imágó alakban telelnek át erdőkben és más avarral fedett területeken. Elsődleges célom annak megállapítása volt, hogy hazai körülmények között is érvényesek-e a Fritzsche által megállapított telelőhelyek, miszerint a legkedvezőbb a Meligethes fajok számára a tölgy és cseres-tölgyes erdő avarja, és a többi vegetáció típus szerepe elhanyagolható [6]. Megfigyeléseimet 2002 őszén és 2003 tavaszán, Keszthelyen és annak 50 km-es körzetében végeztem. Korábbi vizsgálataim alkalmával már felderített telelőhelyeket kerestem fel, hogy avarmintákat gyűjtsek. Emellett számos egyéb biotópból is gyűjtöttem avar és talajmintákat (1. táblázat).

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INTRODUCTION

Meligethes adults which can be found every spring by plant protection experts are always regarded to be Meligethes aeneus but there are more Meligethes species causing damages simultaneously on the rape fields. There have been performed only few faunistical surveys in Hungary up till now and there is only one result dealing with other species which also can cause damages on rape. Among the beetles, which were collected by Manninger and Nolte in Hódmezővásárhely in 1956, three other species were also found besides M. aeneus (det.: Fritzsche) [10].

There are much more scientific results available on international level dealing with different Meligethes species [1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14]. The biology of this genus was studied more intensively by Fritzsche in Germany during his long year's surveys [6].

Because researches of that type have not been carried out in home circumstances I put into the target to study the biology of species Meligethes with special regard to its overwintering. We could consider M. aeneus and other Meligethes species causing damages on rape at the same time as the most important rape pests when the rape wintered infirmly and its development were long drawn-out. If we aim a successful growth of the rape we should not neglect the protection against the pests and continuous improvement of our knowledge in their biology must also be considered highly essential.

Materials and methods

Meligethes species which cause damage on rape have one generation every year and they overwinter as adults in forests or in leaf-litter covered areas several centimetres deep. My primary aim was to establish whether the wintering places, found out by Fritzsche, are valid in Hungary or not. He established that the optimal places for wintering are areas of Turkey oak and oak forest and other types of vegetation are negligible [6]. My studies were performed in Keszthely and its 50 km surroundings in the fall of 2002 and in the spring of 2003. I visited overwintering places, which I explored during my earlier studies, to collect fallen leaf samples. In addition to it I gathered a lot of samples from other biotopes. Six samples were taken from every place and each one was collected from 0,25 m^2. The samples were studied in two ways. Three samples from each place were placed in separator bags then these bags were put on an insectary. The other three samples were processed immediately after their collection. Considering that the species of Meligethes genus have a tiny body the specimens were washed in a pot of 25 cm in a diameter. I had to change the water often because some small dead plant pieces the beetles also rose to the surface. All the beetles were collected and then identified. Stereo-microscopes were used for the identification. Morphological marks, served as a basic to the identification of the species, are: the rear border of the back of the prethorax, the size of the joints in the clubby antenna, the size and shape of the body, the colour and dottiness of the legs and wing-cases, the thickness of the femur, denticulation of the outer edge of the fore-legs, the shape of the male and female sexual organs and speculum. Also, I had to examine the sexual organs as it provided the most solid basis for the precise identification of the different species.

RESULTS

After the separation of the different species in the specimens, originated from various wintering places, the

Table 1. The average number of Meligethes adults after the separation of the different species in the samples (originated from various places)
1. táblázat A különböző helyekről gyűjtött mintákban talált és elkülönített imágók átlagos száma

Type of biotope	Date of collection	Average number of adults per 0,25 m^2	*M. aeneus* %	*M. viridescens* %	*M. coracinus* %	*M. picipes* %
assorted Turkey oak and oak forest	2002. 11. 15.	755	67	17	10	6
assorted Hornbeam and oak forest	11. 15.	267	71	10	5	6
Alder forest	11. 16.	85	77	0	14	9
meadow beside the skirt of the forest	11. 17.	47	59	22	7	12
side of ditch	11. 17.	23	81	6	13	0
kitchen garden	11. 18.	9	69	14	17	0
open meadow	11. 19.	5	100	0	0	0
Pine forest	11. 19.	0	0	0	0	0
stubble-field (after cereal)	11. 21.	0	0	0	0	0
alfalfa	11. 21.	0	0	0	0	0
fruit plantation	11. 16.	0	0	0	0	0
uncultivated field	11. 21.	1	100	0	0	0

former results of Fritzsche seemed to be valid [6]. The results of my investigations are demonstrated in Table 1. The table shows the average number of the adults in each place where I collected the samples. We can read from the table that most of the beetles can overwinter in the leaf-litter layer of the assorted Turkey oak and oak forests. The number of the wintering individuals can be there several thousands per square metre. The leaf-litter layer of the assorted Hornbeam and oak forests can also provide favourable conditions for the adults. However we cannot find there so many beetles in one group. Dead fallen leaf layer of the alder forests is still suitable for the wintering so we can often find there pollen beetle adults. Meadows near to the rape fields beside which there are forests or strips of forests, can be favourable wintering places as well. I can say the same about the dikes, edges of minor roads and kitchen gardens. I was not able to discover any overwintering adults in open meadows, in pine-forests, in untreated corn stubblefields, in perennial pulses and in fruit plantations. The uncultivated field seemed to be unsuitable for overwintering as well.

In the second phase of my investigations I systematically followed the samples in the insectary with great attention. I was curious to know if there was a considerable difference in the time of the species emergence from the wintering places. During the assessment there were used only the samples from the assorted Turkey oak and oak forest because they contained the largest number of adults. According to my observations the emergence depends mostly on the temperature. The quality of the wintering place influences mainly the mortality during the winter period. The winter of 2002 and the spring of 2003 were considerably cold. The temperatures of the first three months of 2003 were pretty much behind the average. This fact determined evidently the reactivation of the beetles in the wintering places and in the insectary too. A really warm, spring-like weather began just in the course of April. The first individuals were observed in the

glass vessels, fixed on the paper bags, on 20th February. At that time a cold period came so I could not find emerging beetles till the middle of March. From that time on I could continuously detect more and more individuals almost every day. The weather at the beginning of April turned cold again, and then came a rise in temperatures from the middle of the month (Figure 1).

CONCLUSIONS

With the help of my studies I succeeded in getting more exact ideas about the overwintering customs of the native Meligethes species which cause damage on rape. I established that there is no considerable difference among the various species how they select their overwintering places. For all frequently appearing species the optimal grounds contain high proportion of humus, are well exposed to the air and are moist, but not damp. These places warm up relatively fast and their temperature can decisively exceed the air temperature in early spring. Very dry conditions are unfavourable for wintering adults and always cause a high level of mortality. It is surprising that the beetles often spend the winter not on the edge of the forests but more hundred metres further in. Meligethes aeneus owing to its greater ecological elasticity always occur in higher number than the other three related species. Since each of them has one generation every year they spend the winter in obligate diapause, i.e. the standstill, to survive the severe winter period, is genetically determined.

I can explain the former emergence of M. aeneus with a sooner transition of its diapause to quiescence at the end of the winter and in early spring. Therefore they are activated by lower temperatures of the wintering places than the other three species. According to Fritzsche M. aeneus is reactivated by 2-3°C while the related species only by 4-8°C.

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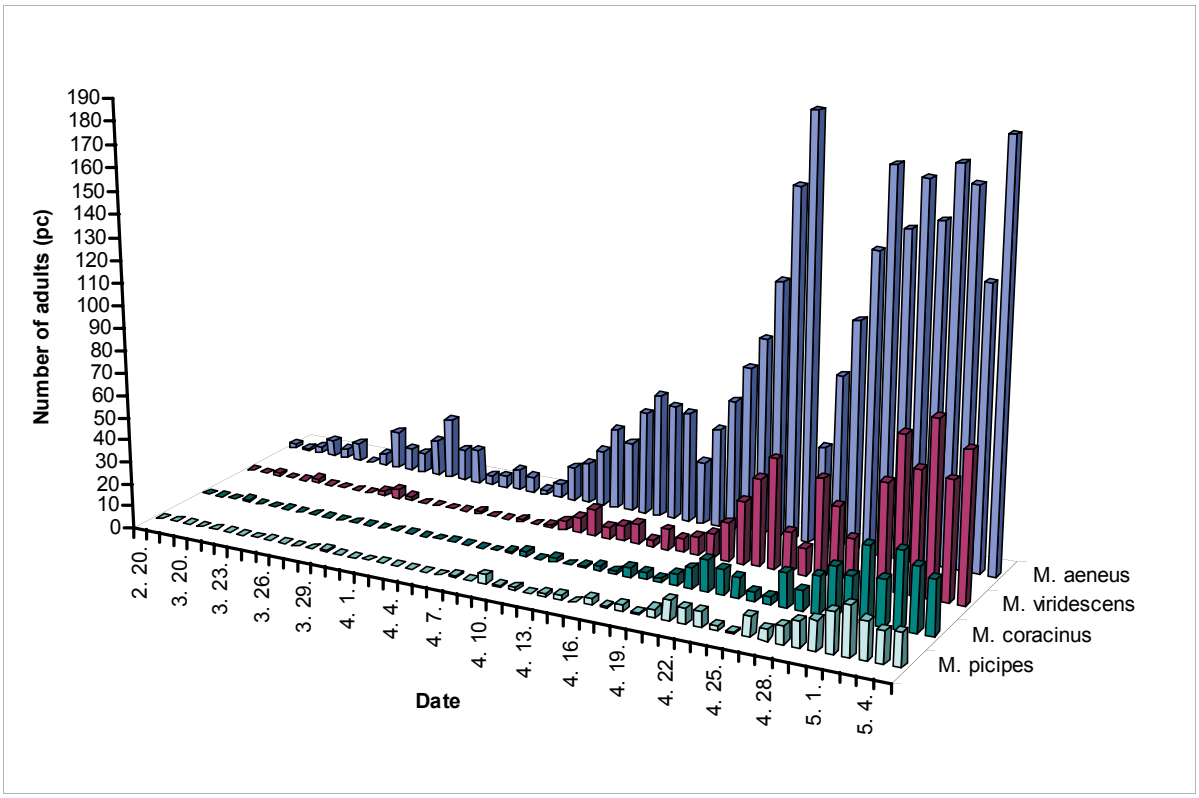

Figure 1. Data of the emergence of the four most common Meligethes species in Keszthely in 2003
1. ábra A négy leggyakoribb Meligethes faj telelésből való előjövetelének karakterisztikája

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