

**INFESTATION OF THE MEDICINAL/ORNAMENTAL PLANT *Alcea rosea* L.
(MALVACEAE) BY THE WEEVIL *Rhopalapion longirostre* OLIVIER, 1807
(COLEOPTERA: CURCULIONOIDEA: APIONIDAE)
IN OLTENIA (SOUTHERN ROMANIA)**

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Abstract. *Alcea rosea* (LINNAEUS, 1758) is an Asian medicinal/ornamental plant introduced in Romania probably by the Turks, centuries ago, now being widely cultivated throughout Romania. Part of a larger study concerning the intensive culture of several medicinal/technical Malvaceae species, we have investigated the infestation of *Alcea* sp. by *Rhopalapion longirostre* (OLIVIER 1807), one of the 3 invasive weevils feeding on Malvaceae such as *A. rosea*, often causing considerable damage in leaves and seeds. Although *R. longirostre* was cited in Europe for the first time from Romania, in 1875, its Romanian range has not been documented until now. We hereby present for the first time for Romania, a list of the locations where *R. longirostre* was found on *A. rosea*, complemented by a grid map in UTM projection system of the species infestation in Oltenia, approximately between 22°30'E – 24°30'E meridians, and the 44° 40'N – 45°40'N parallels; situated approximately between km 4900-5040N of the UTM projection zones 34 and 35. We also present some considerations about the chorology and the ecology of the species with reference to biotic and abiotic factors involved in its distribution and its potential to become a pest of other Malvaceae species of medicinal interest.

Keywords: *Alcea rosea*, *Rhopalapion longirostre*, infestation, Oltenia, Romania.

Rezumat. Infestarea plantei medicinale *Alcea rosea* L. (Malvaceae) de către gărgărița *Rhopalapion longirostre* OLIVIER, 1807 (Coleoptera: Curculionoidea: Apionidae) în Oltenia (sudul României). *Alcea rosea* (LINNAEUS, 1758) este o plantă medicinală/ornamentală asiatică introdusă probabil în România de turci cu secole în urmă, acum fiind larg cultivată în toată România. Parte a unui studiu mai larg privind cultura intensivă a unor specii medicinale/tehnice de malvacee, am investigat infestarea plantei *A. rosea* de către curculionidul *Rhopalapion longirostre* (OLIVIER 1807) una dintre cele 3 gărgărițe care se hrănesc pe malvacee precum *A. rosea* adeseori producând pagube considerabile la semințe și frunze. Deși *R. longirostre* în Europa a fost citată prima dată din România în 1875, aria de răspândire în România nu a fost detaliată până acum. Prezentăm aici în premiera pentru România, o listă a localităților în care am găsit *R. longirostre* pe *A. rosea* L., completată de o hartă raster în proiecție UTM a infestării acestei specii în Oltenia, aproximativ între meridianele 22°30'E - 24°30'E, și paralelele 44°40'N - 45°40'N; situată cam între km 4900-5040N ai zonelor 34 și 35 ale sistemului de proiecție UTM. De asemenea prezentăm unele considerații despre corologia și ecologia speciei referitoare la factorii biotici și abiotici implicați în distribuția ei și despre potențialul ei de a deveni un dăunător la alte specii de malvacee de interes medicinal.

Cuvinte cheie: *Alcea rosea*, *Rhopalapion longirostre*, infestare, Oltenia, România.

INTRODUCTION

As a result of a larger body of work investigating the possibility and opportunity of intensive culture of *A. rosea* in Oltenia, we gathered data about the frequency and range of infestation of this plant by one of its 3 documented invasive apionid herbivores, *Rhopalapion longirostre*.

Alcea rosea is a medicinal/ornamental plant introduced widely in Europe. It originates from temperate Asia and the Ottoman Turks introduced it in Romania probably centuries ago. Being a widely and highly prized ornamental plant, it was repeatedly introduced throughout the country. At present it is distributed ubiquitously throughout the country, mainly cultivated in gardens, but also established around human settlements in the southern part of Romania, where it naturalized in dry, warm, sunny locations, on roadsides. It is characterized by a 1-2.5 meter-long slender, usually unbranched stem. Its flowers grouped in the median part of the inflorescence with indefinite growth represent the part preferred by the weevils to ovoposit.

Rhopalapion longirostre is a monophagous black weevil easily recognisable due to its unusually long rostrum among its European relatives, its grey, thick indumentum and red legs.

It feeds both as adult and preimaginal stages on Malvaceae with sufficiently large seeds, such as *Alcea rosea*, often producing considerable damage in leaves and seeds. The female uses the long rostrum to drill a hole through the two layers of sepals and the petal primordium (Fig. 2B), to reach the ovules where the larva develops. The larvae develop feeding on the monadelphous stamens and then individually on seeds, and pupate inside the mericarpic fruitlets - inside the seeds - emerging after the fruit maturation and dispersal. It is also peculiar among apionids as the adults do not migrate, nor congregate in trees during the unfavourable summer months, but it remain on the host plant hidden between the sepals and the buds, voraciously feeding on the leaves (Figs. 2C; 2D). For more details regarding the biology of *R. longirostre* see DIECKMANN (1977), BEHNE (1998), PUPIER (1997), SPRICK et al. (2002) and WILHELM (2004). Although, according to SAUVARD et al. (2010) it was cited in Europe for the first time in 1875 from Romania, its Romanian range has not been yet documented.

The objective of this paper is to provide a preliminary overall image of the actual distribution of *R. longirostre* in Oltenia.

MATERIAL AND METHODS

Host plant identification:

Due to its probable hybrid origin, the plants found during the survey to resemble *A. rosea* had a large variability, both in terms of morphology and in terms of petal colour. Despite its poorly defined taxonomy, we comprised under the term *A. rosea* all plants that could not be attributed to other *Alcea* species present in Romania (according to MORARIU, 1958), leaving for a later paper the task to ascertain beyond any doubt the assignment of the cited plant specimens or populations to *A. rosea* or to some other related taxa.

Geographical characteristics:

The region involved in our study extends North of Danube being limited to the South approximately by the 44°40'N parallel and the 45°40'N parallel to the North and spanning between 22°30' E meridian to the West and 24°30' E meridian towards East. It comprises the region situated approximately between km 4900-5040N of the UTM projection zones 34 and 35. To establish the UTM geo-codes for the cited locations we have used when applicable Lehrer's work (LEHRER & LEHRER, 1990) or geo-codes derived from GPS coordinate readings from surveys done by the authors. The UTM geo-codes were given when possible for the closest human settlement available.

Because the plant is clearly introduced, the present study did not use altitude or habitat type as a defining criterion for the analysed region, but rather its geographical boundaries.

RESULTS

Our results comprise a number of 27 locations where we found *R. longirostre* on *A. rosea*, all of them newly found by us during the past 20 years (1990-2011). The data are presented below in tabular format (Table 1).

Table 1. List of the locations where we found *Rhopalapion longirostre* on *A. rosea*.
Tabel 1. Lista locațiilor în care a fost găsită *Rhopalapion longirostre* pe *A. rosea*.

County	Location and Altitude (m. s. m.)	UTM Geo-code	Information Source**
CS	Băile Herculane	FQ16	(B 93)
CS	Pecinisca near Băile Herculane	FQ16	(B 92-01)
CS	Băile Herculane (across from hotel Cerna)	FQ17	(B 95)
CS	The railway station near Băile Herculane	FQ17	(B 93-99) (B&N 03)
CS	The Cerna valley, left side	FQ18	(B 95)
CS	Jidoștița	FQ25	(B 93)
CS	Gornenți	FQ27	(B 93)
GJ	Isverna, close to the entrance to "Isverna cave"	FQ28	(B 10)
GJ	Godeanu	FQ38	(B 95)
GJ	Cerna Sat	FQ39	(B95)
GJ	Cloșani	FQ49	(B 93)
GJ	Motru Sec	FQ49	(B 92)
GJ	Runcu	FQ69	(B 92)
GJ	Cheile Sohodolului/Runcu by the motel	FQ69	(B 92)
GJ	Cheile Oltețului close to peștera Polovragi (Polovragi cave)	GR00	(B 04)
MH	Orșova, near the open market	FQ05	(B 93)
MH	Pecinișca	FQ16	(B 93)
MH	Balta Cerbului	FQ18	(B 93)
MH	Gura Văii	FQ24	(B 93)
VL	Râmnicu Vâlcea	KK99	(B 04, B 09)
VL	Valea Bistriței close to the monastery	KL60	(B 94)
VL	Valea Cheii, near schitul Iezer	KL70	(B91)
VL	Olănești Băi, around the baths	KL80	(B91)
VL	Cozia Monastery and in the vicinity	KL81	(B 01)
VL	Turnu Monastery	KL81	(B 97), (B 02-05), (B 09-10)
VL	Brezoi	KL82	(B 07)
VL	Stânișoara Monastery	KL91	(B 97)

Symbols/Legendă: *The UTM geo-codes were given when possible for the closest human settlement available. / **Codurile UTM** au fost date pentru cele mai apropiate așezări umane.

County acronyms/prescurtări județe: CS = Caraș-Severin, GJ = Gorj, MH = Mehedinți, VL = Vâlcea **collector's name and observation year of *R. longirostre* on *A. rosea* are mentioned. / Sunt menționate numele colecătorului și anul (sau anii) în care *R. longirostre* a fost observată pe *A. rosea* (BN + XX) = (Bărcă & Niculae + the last 2 digits of the year when the weevil was found on the plant) e.g. (BN 04) = (BÂRCĂ & NICULAE, 2004) (B + XX) = (Bărcă + the last 2 digits of the year when the weevil was found on the plant in situ).

The sites that could be positively located on the map are presented in figure 1, in a convenient format on a map with UTM quadrants and the hydrographic system. For reference, we have provided in the table the years when we have observed the plants in the mentioned sites, as in figure 1.

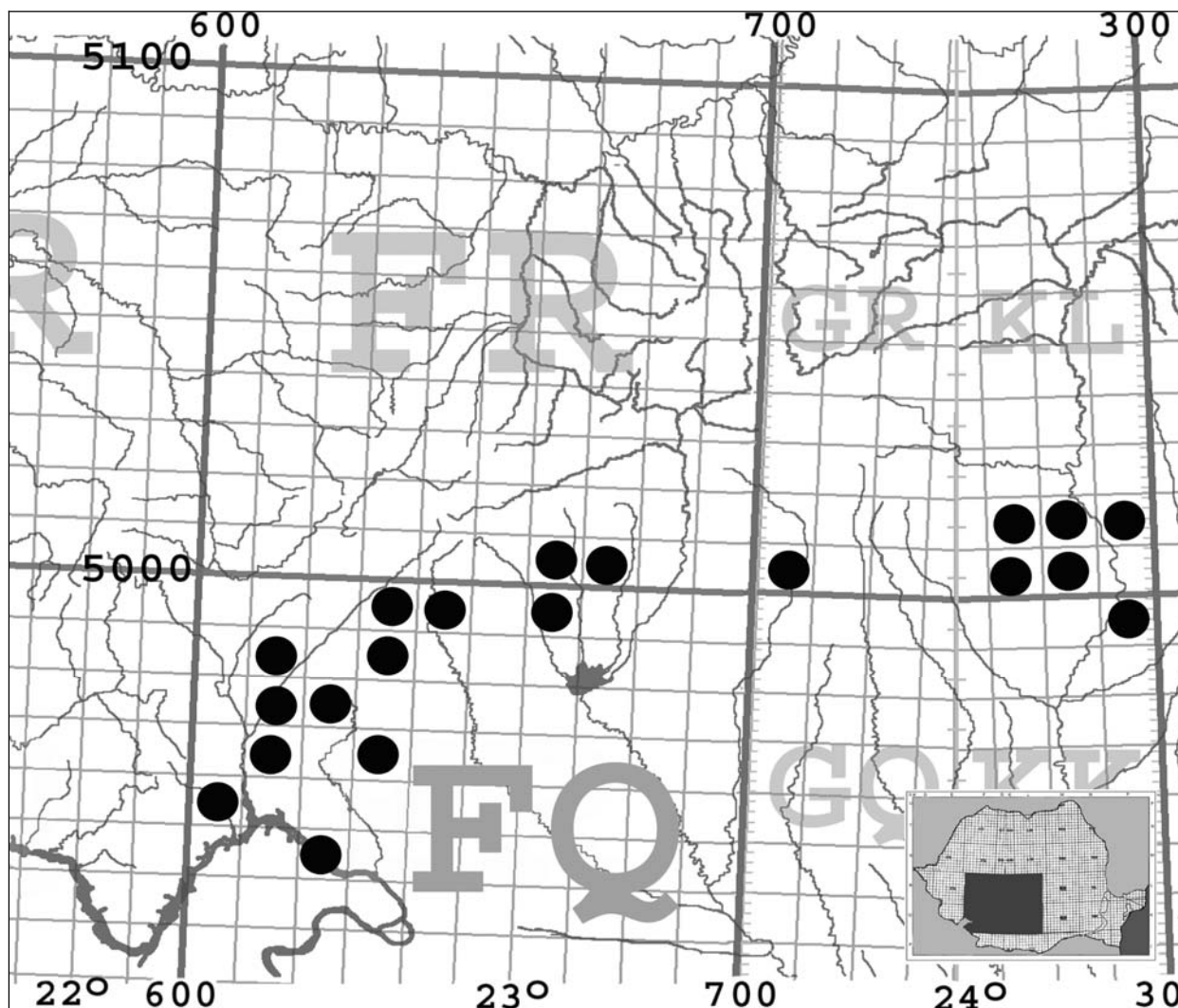


Figure 1. Distribution map in UTM projection system with 100 km quadrants of the sites where *R. longirostre* was found on *A. rosea*; designated by full circles.

Figura 1. Harta distribuției în proiecție UTM cu cvadranți de 100 km ale locurilor unde au fost găsite plante de *A. rosea* infestate cu *R. longirostre*, desemnate de cercurile pline.

DISCUSSIONS

The infestation range of *A. rosea* by *R. longirostre*, in various habitats in Oltenia, is quite large, and seems to be limited not by climatic factors but simply by the actual availability of the plant. Practically we have found the weevil everywhere we have found the host plant. These findings support the fact that the range of *R. longirostre* closely matches its host plant.

In most locations where *Malva sylvestris* L. plants were available close to infested *A. rosea* we could only find adults, eating the leaves and only few holes drilled in the buds or receptacles/fruits of *Malva sylvestris*, this fostering some experimental work which will result in a later paper.

The aspect of the lesions matches the known ones, and the weevil produces (non lethal) lesions (Fig. 2) anywhere *A. rosea* was cultivated or escaped from cultivation, so the infestation range coincides quite closely with the distribution of the plants.

Both the adults and the preimaginal stages of *A. rosea* are closely associated with *A. rosea* and *M. sylvestris*, belonging to its very narrow group of reported Malvacean host-species.

In Oltenia, the adults appear on plants and produce lesions on the leaf in mid-April lasting until Oct – Nov, probably overwintering buried in the soil by the plants. The adults feed on the leaves, remaining on the plant as long as the weather is warm enough, even after the leaves wilt and the fruits are dry. The adults feed on the surface of the leaf, making small round lesions about 1mm in diameter without sclerified, raised rim of scarification tissue. Usually the holes penetrate the leaves, often merging into much larger holes of irregular shape, similar to the lesions produced by snail (Fig. 2A). The adults are often found on the buds “in copul” as seen in figure 2B.

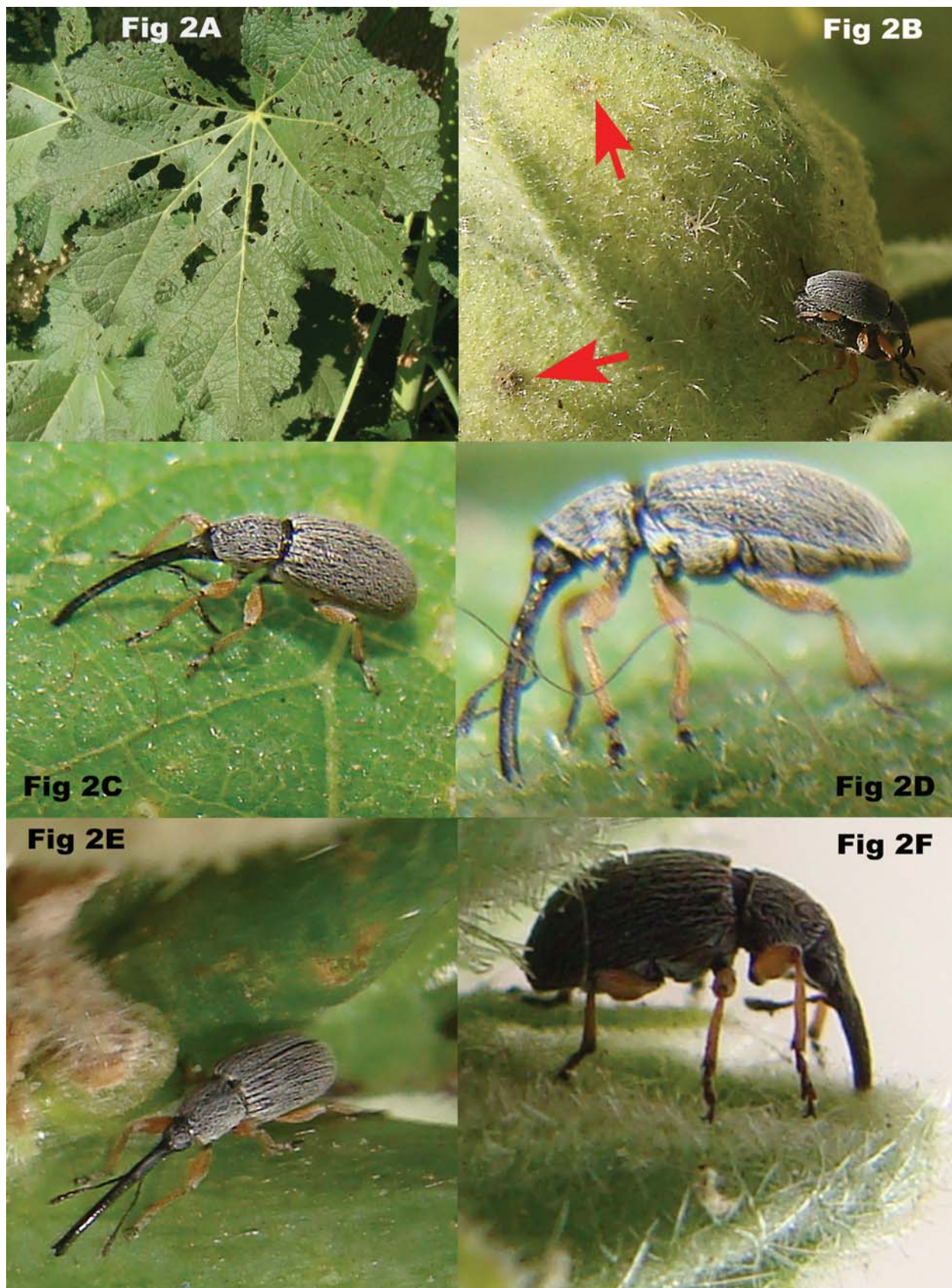


Figure 2. Aspect of the primary and merged perforating lesions resembling those made by snails, inflicted by *R. longirostre* to infested *A. rosea* leaves, “in vivo” – 2A; Aspect of oviposition lesions on the buds (red arrows), with the adults “in copula” – 2B; Female *R. longirostre* feeding on leaves – 2C & 2D, and on a stem – 2E; male feeding on a bud – 2F.

Figura 2. Aspectul leziunilor perforante primare (și confluențe asemănând celor date de melci) induse de *R. longirostre* pe frunzele de *A. rosea* L. infestate „in vivo” - 2A; Aspectul leziunilor la boboci (săgeți roșii) cu adulții „în copula”- 2B; Femele hrănindu-se pe frunze – 2C & 2D și pe o tulpină – 2E; Mascul hrănindu-se pe un boboc – 2F.

CONCLUSIONS

Our preliminary results indicate that indeed the weevil range closely matches its host plant *A. rosea* L. We found it in almost all locations where we searched for it, usually in large to very large numbers of tens of individuals per plant. We expect it to occur in most places where its host plant is available.

The lesions inflicted by *R. longirostre* to *A. rosea* are nonlethal even in the most severely infested plants, as the developing larvae do not destroy all the seed in the capsules infested, and the adults do not manage to destroy the foliage to a significant extent.

The adults may possibly pose a significant threat only when massive attacks occur in dense, intensive cultures of the local plant of medicinal interest *Malva sylvestris*, but its vulnerability to this weevil attack remains to be clarified by further research

Our data, although still incomplete, will help scholars studying this species to better understand some of the biological, ecological, and chorological features of this taxon. This study will also form the basis of a complete distribution map of *R. longirostre* in Romania and will provide data for a study regarding the alleged possibility of transfer of *R. longirostre* from its regular host plant *A. rosea*, to other Malvaceae of medicinal interest native to Romania, especially *Malva sylvestris*, which is a widely distributed native plant that has the potential to naturalize small-bodied *R. longirostre* by establishing large, local overwintering populations of the weevil.

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