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Invasions by *Chilo* Zincken, 1817 to the south of European Russia (Lepidoptera: Crambidae)

A. N. Poltavsky & K. S. Artokhin

Abstract

Invasion notes about East-Palaearctic species: *Chilo christophi* Błeszyński, 1965, *Chilo niponella* (Thunberg, 1788) and *Chilo suppressalis* (Walker, 1863), that have appeared in the south of European Russia in the XX-XXI centuries. These three species have invaded southern Russia from three directions: from the Volga regions, from West Transcaucasus and from East Transcaucasus. Their populations mix with local populations of familiar native species: *Chilo phragmitellus* (Hübner, [1805]), *Chilo luteellus* (Motschulsky, 1866) and *Chilo pulverosellus* Ragonot, 1895. This cause problems for pest control, as regional agronomists cannot successfully recognize the externally similar pest-species. *Chilo niponella* is reported for the first time for Rostov-on-Don Province of Russia. It is a potentially dangerous rice-pest. *Chilo suppressalis* is already damaging rice in Astrakhan province. The limiting factor for *Chilo* species is reed firing in the periods of summer drought.

KEY WORDS: Lepidoptera, Crambidae, *Chilo* snout moths, invasions, south of European Russia, Russia.

Invasión por *Chilo* Zincken, 1817 en el sur de Rusia europea (Lepidoptera: Crambidae)

Resumen

Notas sobre la invasión por las especies del este paleárticas: *Chilo christophi* Błeszyński, 1965, *Chilo niponella* (Thunberg, 1788) y *Chilo suppressalis* (Walker, 1863) hacia el sur de Rusia europea en los siglos XX-XXI. Estas tres especies invadieron el sur de Rusia desde tres direcciones: desde la región del Volga, desde el oeste del Transcáucaso y desde el este del Transcáucaso. Sus poblaciones se mezclan con las poblaciones nativas de las especies: *Chilo phragmitellus* (Hübner, [1805]), *Chilo luteellus* (Motschulsky, 1866) y *Chilo pulverosellus* Ragonot, 1895. Esto hace que surjan problemas para el control de plagas, por parte de los agrónomos regionales que no pueden reconocer las especies plaga fácilmente, al presentar una morfología exterior muy similar. La especie *Chilo niponella* - se menciona por primera vez para Rostov del Don, provincia de Rusia. Es una peligrosa plaga potencial del arroz. La especie *Chilo suppressalis* ya produce daños al arroz en la provincia de Astracán. El factor limitante para las especies de *Chilo* es la quema de los cañaverales en los periodos de sequía estival.

PALABRAS CLAVE: Lepidoptera, Crambidae, *Chilo* snout moths, invasión, sur de Rusia europea, Rusia.

Introduction

There are 13 species of *Chilo* snout-moths that inhabit wet-lands of the Palaearctic, feeding on stems and leaves of Gramineae. Some of them are referred to as pests of rice, maize and sugar-cane (BŁESZYŃSKI, 1970). Intensive monitoring of snout-moths in XXI century revealed six *Chilo* species in the southern regions of European Russia. Three species: *Chilo christophi* Błeszyński, 1965; *Chilo niponella* (Thunberg, 1788) and *Chilo suppressalis* (Walker, 1863) are supposed to be invaders from

the border regions. Species *Chilo niponella* is also known under junior synonym = *Chilo hyrax* Bleszyński, 1965 (KARSHOLT & NIELSEN, 1986). The distribution areas of the others three: *Chilo phragmitellus* (Hübner, [1805]), *Chilo luteellus* (Motschulsky, 1866) and *Chilo pulverosellus* Ragonot, 1895 - cover Western and Southern Europe, including southern Russia.

Regular monitoring of *Chilo* species is a most urgent practical problem of plant protection. Specific identification is important, as all *Chilo* species are morphologically very similar, but only some of them are - potential pests of agricultural crops in the south of Russia.

Materials and Methods

Chilo snout-moth species were caught by regular light-trapping in 52 sites of Rostov-on-Don Province in 2007-2014. Throughout the entire period there were in use different mercury vapour lamps (HQM), 160 W: "Osram", "Narva", "Natrium", "Philips". Moths immobilized in automatic light-traps by dichloroethane vapour.

Original photographs of the imago were made for this paper from A. N. Poltavsky's private collection (Rostov-on-Don), using a camera Nikon D-90; photographs of male and female genitalia were made using microscope «MBI-3» with digital camera Nikon D-70. Digital photos were retouched for publication by means of program CorelPhotoPaint-5. The photos both imago and their genitalia combined in the Figures without natural proportions.

Results

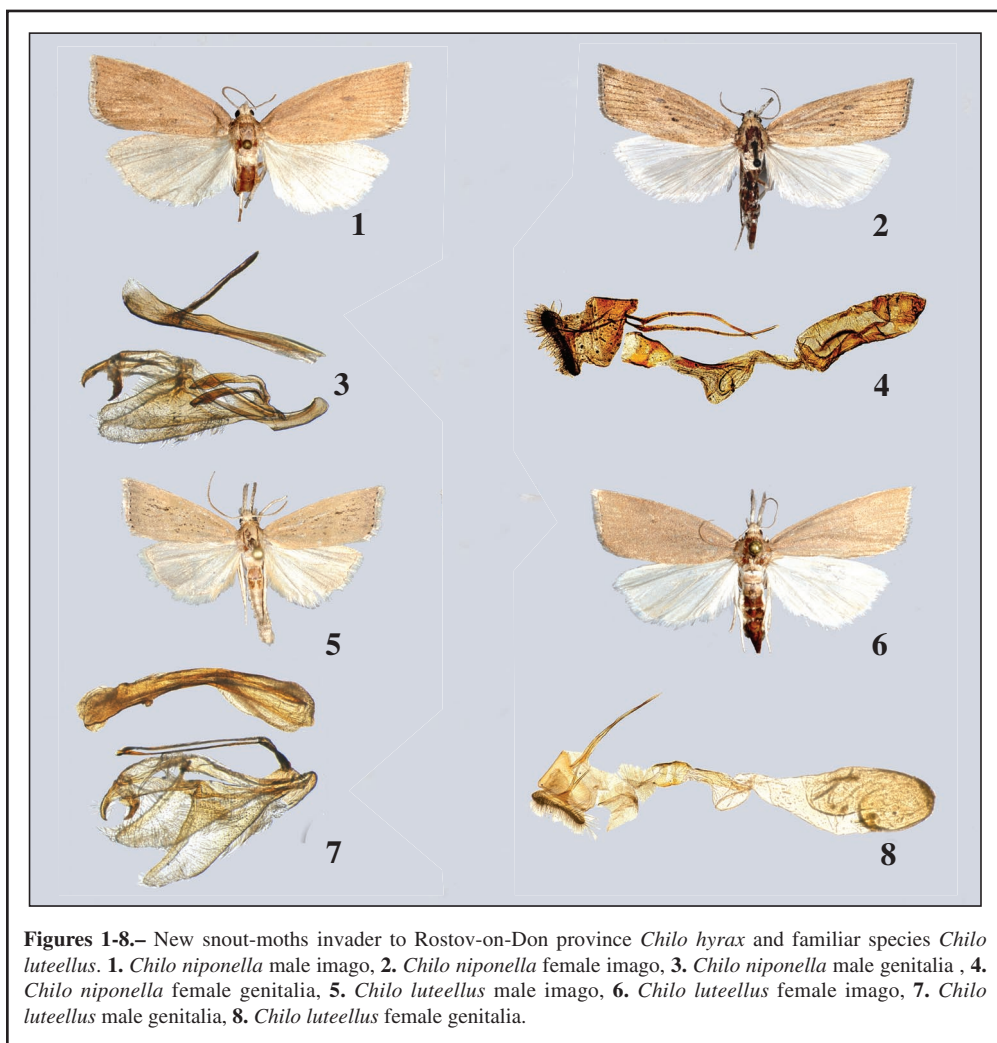
Since 2007 in the Rostov-on-Don Province there were collected 108347 snout-moths specimens. Altogether 490 *Chilo* specimens were revealed in 26 sites, closely located to rivers valleys or ponds. But only in the river's Don Delta they were rather numerous. Three of this stemborers are more or less

Table 1.— Catching of *Chilo* species by light-trapping in Rostov-on-Don Province.

<i>Chilo</i> species	Year	Number of catching sites	Number of specimens	Flight period
<i>Ch. niponella</i>	2009	1	1	11-V
	2013	1	1	28-VII
	2014	1	49	1-16-V
<i>Ch. pulverosellus</i>	2007	1	1	10-VIII
	2009	1	1	15-VII
	2011	1	15	26-VII-24-VIII
	2012	1	1	6-VIII
	2013	1	2	31-V-17-VIII
<i>Ch. luteellus</i>	2008	3	5	8-VII-8-VIII
	2009	2	2	9-14-VII
	2010	1	1	28-VI
	2011	1	2	30-VIII
	2012	5	15	22-V-7-VIII
	2013	1	4	31-V-16-VIII
	2014	2	155	10-22-VI
<i>Ch. phragmitellus</i>	2007	5	16	21-V-24-VIII
	2008	6	16	21-V-8-VIII
	2009	5	25	3-VI-4-VIII
	2010	7	79	11-V-29-VII
	2011	2	6	21-V-19-VII
	2012	6	78	7-V-25-VIII
	2013	3	3	4-V-25-VIII
	2014	4	12	11-V-13-VII

common and regularly revealed in XXI century: *Chilo phragmitellus*, *Chilo luteellus* and *Chilo pulverosellus*. The new one species - *Chilo niponella* (SLAMKA, 2008, he have not this species in this book) appeared in 2009: primary in the north of the Province. Next appearance registered in 2013 in the Low Don valley and in May 2014 it was a mass flight just in the river's Don Delta (Table 1). We report about this appearance for the first time. This is mean, that distribution area of *Chilo niponella* already reaches the East Europe.

The species *Chilo niponella* (reed stalk borer) originally had East-Palaeartic distribution with the most western known sites in southern Ural. There are no any intermediate catching sites between Rostov-on-Don Province and southern Ural. Probable reasons - the lack of monitoring sites or insufficient experience of regional entomologists which work in the Volga regions. Thus, it is sometimes very difficult to distinguish *Chilo niponella* and *Chilo luteellus* visually. In most cases the moth's genitalia preparation must be carried out (Figs. 1-8). Species *Chilo niponella* is also known as a rise pest (YASUMATSU & YANO, 1968: as *hyrax*).



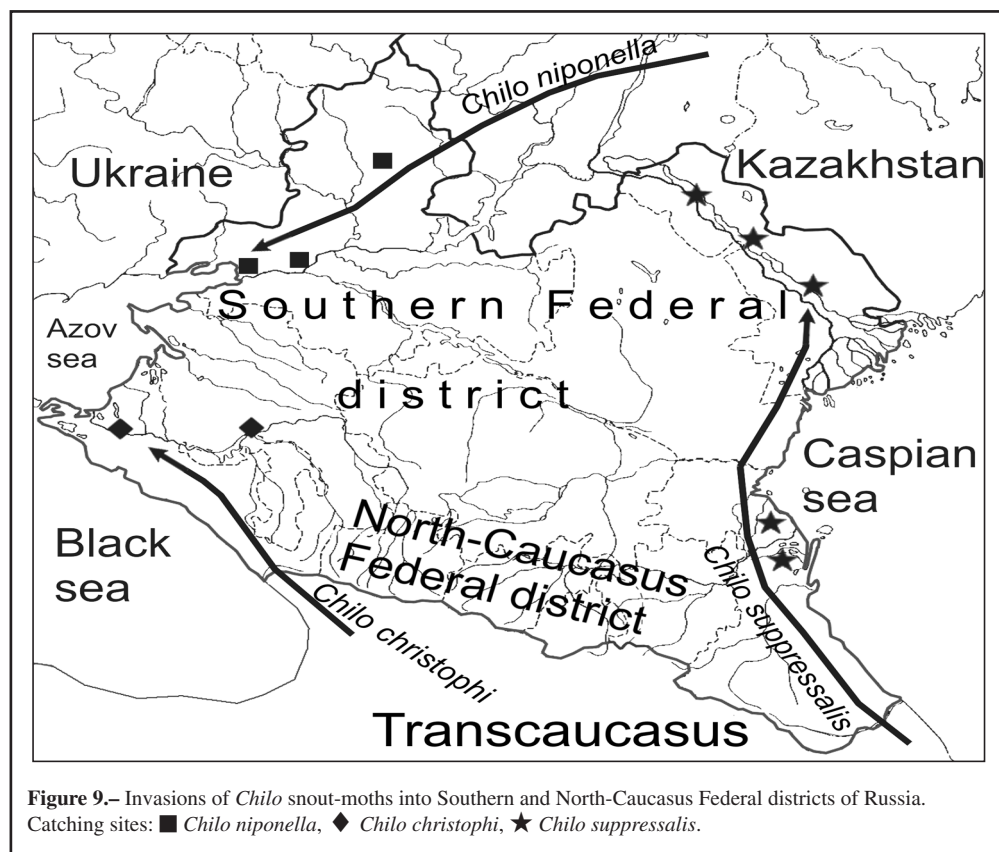
Figures 1-8.– New snout-moths invader to Rostov-on-Don province *Chilo hyrax* and familiar species *Chilo luteellus*. 1. *Chilo niponella* male imago, 2. *Chilo niponella* female imago, 3. *Chilo niponella* male genitalia, 4. *Chilo niponella* female genitalia, 5. *Chilo luteellus* male imago, 6. *Chilo luteellus* female imago, 7. *Chilo luteellus* male genitalia, 8. *Chilo luteellus* female genitalia.

The species *Chilo suppressalis* (Asiatic rice borer) has East-Palaearctic distribution. Since 1980-th it was found in rice crops in Daghestan and in the Astrakhan Province. Probably, to the South of Russia it went from Iran, where it damaged rice in 1970-th (IZHEVSKIY & MASLYAKOV, 2008). Our recent imago monitoring in 2008 by light-trapping and in 2013 by bait-trapping revealed a big number of *Chilo suppressalis* in Astrakhan Province. On some rice-fields there were damaged about 50% of plants by caterpillars. But in the rice farms of Rostov-on-Don Province we didn't find this pest yet. The rice-growing zone here is in the Kuma-Manych Depression which is stretched from the Caspian Sea to the river Don mouth.

The species *Chilo christophi* has also East-Palaearctic origin, but actively expanded to the West up to southern Ural, Transcaucasus (Armenia) and Romania (Danube Delta) (SLAMKA, 2008). Recently it appeared at the North-West Caucasus (SHCHUROV & LAGOSHINA, 2013), probably from Transcaucasus along the Black sea coast. It didn't reach the Rostov-on-Don Province yet and didn't report as a pest in the south of Russia.

Discussion

Preliminary investigations of modern formation of the *Chilo* snout-moths complex in the south of European Russia displays the possibility of species invasions into the region by various ways (Fig. 9). Each of three East-Palaearctic snout-moths, which invaded the south of Russia, has supposedly different ecological adaptations.



In particular, *Chilo suppressalis* is the most thermophilic, as its main area is in the South-East Asia. So, it invade to south Volga region by south-eastern way through the Transcaucasus. Continental climate of Rostov-on-Don Province perhaps, limiting its expansion to the West.

Snout-moth *Chilo niponella* with the Far East origin is boreal species. So, it came to Rostov-on-Don Province out of the south Ural likely. Actually, collecting sites in the Province indicates the advance stages of its invasion.

Snout-moth *Chilo christophi* with distribution not only in the Far East, but also in Middle Asia, China and Transcaucasus has intermediate habit of ecological adaptation, in comparison with two previous species. The mild climate of the North-West Caucasus is the most suitable to its initial acclimatization in the south of Russia.

Three new snout-moth species enrich the native moth's entomofauna of the Southern Russia. In the same time this is a reason for concern about negative changes in agroecosystems. *Chilo* snout-moths monitoring is necessary to continue all over the rice-growing areas and in the maize plantations.

The number of *Chilo* specimens in annual light-trapping accounts strongly varies. Until the population of *Chilo niponella* feeding only by marsh plants in the river's Don Delta it dramatically reduces because of the reeds firing in the periods of summer drought. The same destiny and at other stemborer species of Lepidoptera.

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