

***IPS DUPLICATUS* (SAHLBERG) (COLEOPTERA: CURCULIONIDAE, SCOLYTINAE) DISTRIBUTION IN ROMANIA – PRELIMINARY RESULTS –**

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Abstract: *Ips duplicatus* was collected in Romania for the first time in 1948. Afterwards, between 1957 and 1967, it was found in different places, but only as a faunistic element. The first outbreak of this species was reported in 2008 in spruce stands installed outside the natural area (the North-Eastern part of Romania). Using pheromonal traps in 2010 we initiated the checking of its presence in five locations of Suceava County, and the research continued in 2011 in thirty-one locations distributed within the most areas of the country where the Norway spruce is growing, but only up to 1000 m altitude. *Ips duplicatus* specimens were captured in most places. Most captures (about 2500 beetles/day) were recorded in the Zamostea location (the North-Eastern part of Romania), in an area where *Ips duplicatus* population attained the epidemic level.

Key words: *Ips duplicatus*, Romania, distribution.

1. Introduction

At the beginning of the 20th century, the Northern bark beetle *Ips duplicatus* [Sahlberg, 1836] was naturally encountered through Euro-Siberian taiga from the Scandinavian Peninsula, to the Sakhalin Island and sporadically in the Alps [10], [11], [14].

After 1920, the species is reported more frequently in Central Europe (1920: Luboreč - Slovakia [15]; 1921: Těšín - the Czech part of Lower Silesia [13]) and after 1970 it is considered common in the spruce stands in Slovakia [6] and Czech

Republic [3], located at altitudes below 1000 m a.s.l. [16]. In Poland, the species is frequent in the South-West Sudeten Mountains to the North of Carpathian Mountains [4]. *Ips duplicatus* has extended its areal also toward Western Europe (Belgium, France), Central Europe (Germany, Hungary) and even in South-Eastern Europe (former Yugoslavia, Romania, Bulgaria) [17]. In Asia, this bark beetle is recently recorded in China (in the Lower Mongolia) [15] and in Japan (Honshu Island) [17].

In Romania, the Northern bark beetle *Ips duplicatus* was first detected in 1948 in the

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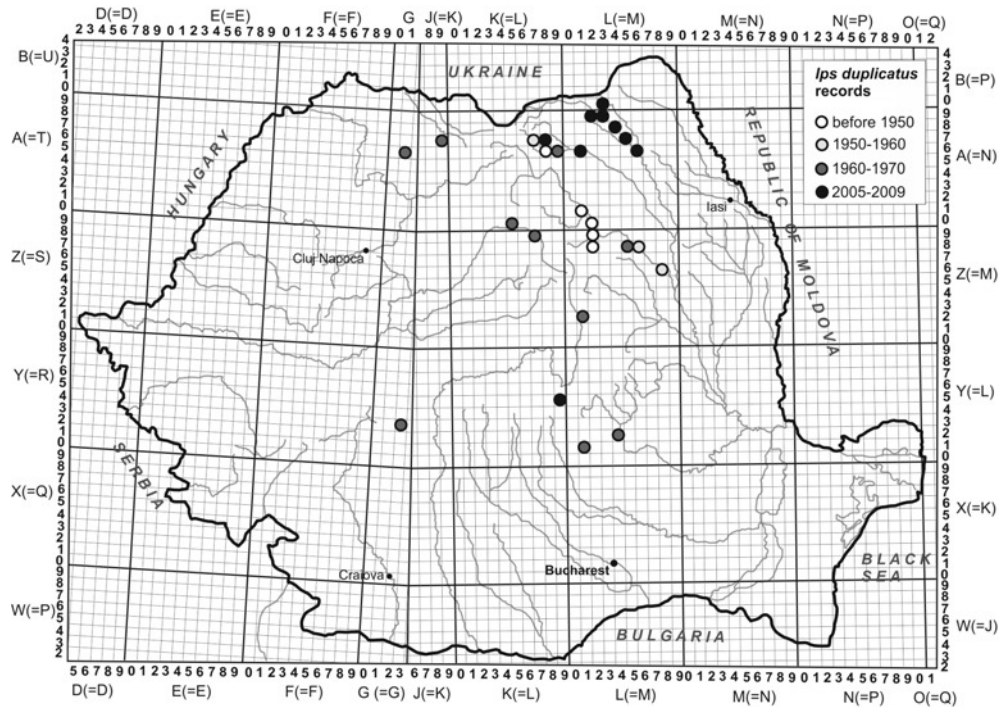


Fig. 1. Records of *Ips duplicatus* in Romania before 2009 [9]

Rarău Mountains (the North part of Eastern Carpathians) [7]. Thereafter until 1970 the species was sporadically observed in different locations along the Eastern and Southern Carpathians, but all records had a faunistic character [7], [12]. All locations were situated between 175 and 1200 m a.s.l. [9] (Figure 1).

After 2005, the species was found in the mountain area of Suceava County (Paltinu, Frasin) within pheromonal traps deployed to capture *Ips typographus*, as well as in Braşov County (Tărlungeni), but using specific pheromone for *Ips duplicatus*. In the hilly area of Suceava County (Zamosteia, Calafindeşti, Feteşti, Dolhasca, Fălticeni), it was detected in infested spruce trees from stands growing outside of the natural area, where this scolytid species caused intense attacks [8], [9].

Based on the invasive character of this bark beetle species, we considered it

necessary to make new observations on its areal in Romania.

2. Material and Methods

The presence of *Ips duplicatus* in different locations was verified with pheromonal traps (Intercept® type) baited with synthetic specific pheromone ID-Ecolure (Fytopharm Slovakia). The observations began in 2010, when in Suceava County three traps were installed in each of the five locations (number 1-5 from Appendix 1), situated at different altitudes that vary between 350 and 1280 m a.s.l. In 2011 we installed only one trap in each of the thirty-one locations distributed in the whole area of spruce stands, at altitudes of 200-800 m (number 5-35 from Appendix 1). All locations were situated in pure or mixed Norway spruce stands, aged 35-115 years (Appendix 1).

The traps were installed at 10-12 m from the forest edge. In 2010, the distance between traps was 30 m. The traps were checked every 7-14 days. The monitoring of the traps was made in the vegetation seasons of 2010 and 2011, in different periods from case to case, mostly in May and June (Appendix 2).

The biological material collected from traps was preserved frozen or in ethanol (90%), until laboratory processing.

3. Results

Northern bark beetle *Ips duplicatus* was found in most locations (ca. 75%) (Appendix 2), in Eastern and Southern Carpathians, in Apuseni Mountains, in hilly area of Eastern Romania and in central part of Transilvania, near Reghin.

This species was not found in the Banat Mountains (Figure 2).

The highest average captures (1188.5 beetles/trap/week) were counted at Zamostea (Suceava County), where during the maximum flight period, more than 2500 beetles/trap/day were recorded.

Significant catches (more than 500 beetles/trap/week) were registered in other locations of North-Eastern Romania, in spruce stands installed outside the natural area, where bark beetle populations have exceeded the epidemic level (Calafindești, Fetești) (Appendix 2).

Captures ranging between 50 and 500 beetles/trap/week were reported from the hilly area of Botoșani County (Bahlui, Flămânzi-1, Flămânzi-2) and the mountain area of Neamț County (Ața) and Suceava County (Frasin).

In the other locations where this species has been identified, the number of catches was below 50, frequently even below 1 beetle/trap/week. In these locations, the

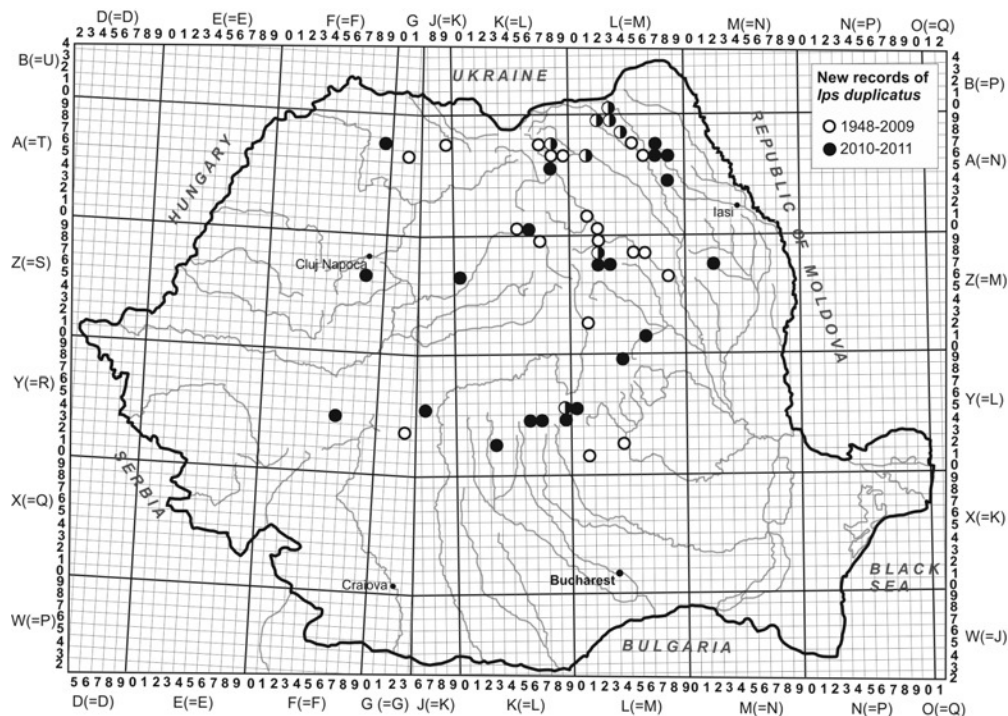


Fig. 2. Actual records of *Ips duplicatus* in Romania

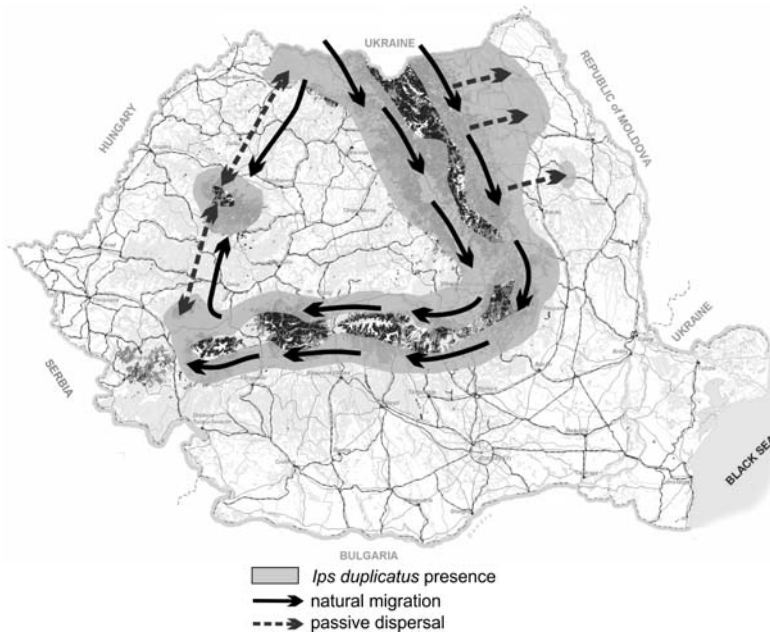


Fig. 3. Migration scenario to *Ips duplicatus*

populations of *Ips duplicatus* probably had an endemic level.

Ips duplicatus bark beetle was not captured in traps installed in the following locations: Scânteia (Vrancea County), Gura Teghii (Buzău County), Berevoeşti (Argeş County), Răcădău (Braşov County), Gura Râului, Avrig (Sibiu County), Baia Mare-1, Baia Mare-2 (Maramureş County) and Izvoarele Nerei (Caraş-Severin County).

4. Discussions

As expected, *Ips duplicatus* was found in almost the whole area of the Norway spruce in the Carpathian Mountain, but also in some spruce stands installed outside the natural area.

According to Negru and Ceianu [7] and Vasiliu et al. [12], this species was encountered until 1970 in the spruce forests in Eastern and Southern Carpathians. Currently, this species is found in Apuseni Mountains, but not reported in the Banat Mountains yet.

It is supposed that the migration of *Ips duplicatus* along the Carpathian Mountains (Figure 3) occurred naturally, mainly through the forests with spruce located at altitudes below 1000 m (this species is very rarely found above this altitude [2], [9]). Farther, it arrived within the spruce stands situated outside the natural area most probably through passive dispersal by transportation of insect-infested logs to processing factories (Figure 3). Here, insects have found favourable conditions for their development due to the decline of these stands following the action of several factors: extended drought, pseudogleic soils, high density of spruce trees (more than 2000 trees per hectare etc. [1], [9]).

On the other hand most of these stands are aged between 35 and 45 years having trees with the bark thickness that rarely exceeds 4 mm. Consequently the more aggressive competitor *Ips typographus* finds unfavourable conditions for its development, allowing the spread of *Ips duplicatus*.

Overall, the most likely causes of expansion of this species in Central and South-Eastern Europe are importation of infested spruce logs from northern countries and extending the spruce plantations outside the natural area of this tree species [5].

5. Conclusions

1. The distribution area of *Ips duplicatus* in Romania overlaps with most of the Norway spruce area growing at less than 1000 m a.s.l.

2. The epidemic level of the *Ips duplicatus* population was recorded in the north-eastern part of Romania, in Norway spruce stands installed outside the natural area.

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Appendix 1

Aspects regarding the locations where pheromonal traps have been set-up for Ips duplicatus detection

No	Location	County	Coordinates	Elevation [m]	Forest composition	Forest age [years]
1	Giurnalău	Suceava	47°26'44.49"N; 25°27'41.84"E	1210-1280	10 Mo	90
2	Trei Movile	Suceava	47°34'37.65"N; 25°31'10.87"E	880-900	10 Mo	90
3	Ionu	Suceava	47°37'44.04"N; 25°28'55.90"E	910-920	7Mo2Br1Fa	110
4	Frasin	Suceava	47°32'00.59"N; 25°46'42.27"E	585	7Mo3Br	100
5	Zamostea	Suceava	47°52'51.76"N; 26°08'32.22"E	375	10Mo	40
6	Calafindești	Suceava	47°51'00.14"N; 26°08'37.48"E	490	10Mo	40
7	Fetești	Suceava	47°43'33.34"N; 26°21'02.70"E	350	10Mo	35
8	Flămânzi-1	Botoșani	47°34'13.11"N; 26°40'33.79"E	320	10Mo	40
9	Flămânzi-2	Botoșani	47°34'03.74"N; 26°39'52.61"E	318	10Mo	40

10	Bahlui	Botoșani	47°29'36.92"N; 26°39'53.42"E	330	10Mo	40
11	Tătăruși	Iași	47°21'24.82"N; 26°36'41.09"E	410	10Mo	45
12	Bolovăniș	Neamț	46°46'49.79"N; 26°09'15.84"E	613	10Mo	80
13	Brateș	Neamț	46°44'58.40"N; 26°04'05.85"E	782	10Mo	110
14	Ața	Neamț	46°48'30.07"N; 26°04'16.10"E	710	10Mo	70
15	Valea Uzului	Bacău	46°19'17.31"N; 26°17'20.18"E	758	9Mo1Br	85
16	Ivănești	Vaslui	46°38'31.97"N; 27°19'58.80"E	200	10Mo	40
17	Scânteia	Vrancea	45°49'26.70"N; 27°00'29.52"E	610	7Mo3Fa	35
18	Gura Teghii	Buzău	45°31'37.46"N; 26°25'08.78"E	608	6Mo4Fa	65
19	Berevoești	Argeș	45°14'09.32"N; 24°56'19.23"E	560-600	7Mo2La1Pi	35
20	Târlungeni	Brașov	45°37'22.23"N; 25°46'13.50"E	771	10Mo	115
21	Poiana Brașov	Brașov	45°37'18.59"N; 25°32'58.64"E	963	10Mo	100
22	Răcădău	Brașov	45°37'19.59"N; 25°35'38.04"E	718	3Mo4Fa3Ca	70
23	Râșnov	Brașov	45°34'58.84"N; 25°27'55.07"E	670-730	10Mo	110
24	Tohanu Vechi	Brașov	45°34'58.49"N; 25°21'07.42"E	690	6Mo4Pi	50
25	Gura Râului	Sibiu	45°43'30.13"N; 23°58'01.44"E	700-800	8Mo2Fa	70
26	Avrig	Sibiu	45°39'02.42"N; 24°25'23.06"E	650	10Mo	35
27	Tălmăcel	Sibiu	45°38'25.05"N; 24°14'02.76"E	540-810	5Mo2Pi1Fa1Me1La	35
28	Sibisel	Hunedoara	45°45'19.96"N; 23°15'28.52"E	500-600	8Mo2Fa	100
29	Brețcu	Covasna	46°02'39.97"N; 26°18'42.34"E	640	10 Mo	40
30	Răchitiș	Harghita	47°00'26.89"N; 25°29'35.90"E	830-915	10Mo	50
31	Filipișu Mare	Mureș	46°44'46.69"N; 24°35'18.78"E	380-450	8Mo1La1Ca	35
32	Baia Mare 1	Maramureș	47°36'59.45"N; 23°38'2.07"E	240	10Mo	50
33	Baia Mare 2	Maramureș	47°39'20.58"N; 23°28'22.07"E	250	10Mo	40
34	Tăuții Măgheruș	Maramureș	47°42'20.87"N; 23°26'57.79"E	400	10Mo	45
35	Izvoarele Nerei	Caraș Severin	45°04'28.52"N; 21°04'14.68"E	680	10Mo	45

Appendix 2

Ips duplicatus catches situation

No	Location	Monitored period	<i>Ips duplicatus</i> beetle catches	
			Total	Beetles/trap/week
1	Giurnalău	May - September 2010	1	<0.1
2	Trei Movile	May - September 2010	468	8.0
3	Ionu	May - September 2010	69	1.5
4	Frasin	May - September 2010	3422	60.0
5	Zamostea	May - September 2010	41238	687.3
		April - July 2011	15450	1188.5
6	Calafindeşti	April - July 2011	8755	673.5
7	Feteşti	April - July 2011	9540	733.8
8	Flămânzi 1	June 2011	255	63.7
9	Flămânzi 2	June 2011	971	242.8
10	Bahlui	June 2011	415	103.8
11	Tătăruşi	June 2011	3	1.0
12	Bolovaniş	May - June 2011	5	1.0
13	Brateş	May - June 2011	1	0.2
14	Aţa	May - June 2011	1024	204.8
15	Valea Uzului	June 2011	3	1.0
16	Ivăneşti	June 2011	5	1.7
17	Scânteia	June 2011	0	0.0
18	Gura Teghii	June 2011	0	0.0
19	Berevoeşti	June 2011	0	0.0
20	Târlungeni	May - June 2011	25	12.2
21	Poiana Braşov	May - June 2011	4	1.0
22	Răcădău	May - June 2011	0	0.0
23	Râşnov	May - June 2011	5	1.2
24	Tohanu Vechi	May - June 2011	5	1.2
25	Gura Râului	June 2011	0	0.0
26	Avrig	June 2011	0	0.0
27	Tălmăcel	June 2011	1	0.3
28	Sibisel	June 2011	1	0.3
29	Breţcu	June 2011	1	0.3
30	Răchitiş	June - July 2011	30	10.0
31	Filipişu Mare	June - July 2011	1	0.3
32	Baia Mare 1	May - June 2011	0	0.0
33	Baia Mare 2	May - June 2011	0	0.0
34	Tăuţii Măgheruş	May - June 2011	3	1.0
35	Izvoarele Nerei	August 2011	0	0.0