

AN ATTEMPT TO DETERMINE THE EFFECT OF THINNING RESIDUE ON DEVELOPMENT POSSIBILITY OF *PITYOGENES BIDENTATUS* (COLEOPTERA, CURCULIONIDAE) IN PINE STANDS

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Abstract. The aim of the study was to investigate the dependency between size reduction rate of thin pine stem fragments and population size of young *Pityogenes bidentatus* beetles, which developed on this material. Experimental plots were established in seven *Pinus sylvestris* stands. Thin stem tops were left on the ground after thinning. Some of them were cut into sections of 20, 50 and 100 cm. Results of the investigations showed that in case of thinning interventions in the spring-summer season more specimens of *Pityogenes bidentatus* are likely to develop on stems cut into short sections than it is the case when stems were left uncut.

Key words: *Pityogenes bidentatus*, forest protection, size reduction of wood material

INTRODUCTION

Tending interventions, such as thinning, should among other things enhance resistance of pine stands to colonization by harmful insects [Szujecki 1985, Szymański and Ilmurzyński 1999]. The removal of suppressed, weakened and dying trees should promote it. Due to the common concerns that thinning residue left in tree stands may be a good material for the multiplication of numerous harmful insect species it has been recommended and required to remove this material from forests [Sierpiński 1980]. Practical measures, aiming at the maintenance of good health state of stands, are defined in detail in different recommendations [Instrukcja... 2004]. However, recently – to a large extent in relation to the ecological approach to forest economy – the tendency to leave a considerable part of thinning residue on site, in order to ensure its natural decomposition, has become increasingly popular [Führer 1997]. Economic considerations are equally important, as the sale of the very thin wood material is not always feasible or const-effective.

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However, leaving residue of freshly cut pine trees on a massive scale, especially in the activity period of adult cambio- and xylophagous insects, may lead to increased multiplication of these insects [Korczyński and Augustyniak 2002]. In order to prevent such consequences it is advisable to perform thinning procedures in such periods when adult insects are inactive or are not found. Moreover, material in the forest needs to be left in the form making colonization by harmful insect species difficult [Korczyński 2004].

This study was an attempt to assess whether cutting of pine stem tops into short sections prevents their colonization by harmful insects and reduces the development possibility of one of the most common bark beetle species of pine stands, i.e. the two-toothed pine beetle *Pityogenes bidentatus*.

MATERIAL AND METHODS

Investigations were conducted in central-Western Poland, in the Zielonka Forest Experimental Station and in the Babimost Forest District, in seven stands of Scots pine *Pinus sylvestris* L., aged 25-38 years. In the Zielonka Forest District five thinning remaining stands were selected for the experiments. A total of 36 stem tops with the top log diameter smaller than 7 cm were selected in each experiment. Next 12 stem tops were divided into 20 cm long sections, 12 stem tops were divided into sections of 50 cm, while the other 12 were left uncut in the stand. In the Babimost Forest District in each of the two stands a total of 48 stem tops were selected for experiments, divided into sections similarly as in the Zielonka Experimental Forest Station, whereas additionally 12 of them were cut into 1 m long sections.

Thinnings were performed in July, August and September, 1999 and in January and March, 2000. Stem tops were cut into sections immediately after thinning. The number of exit holes of young beetles of *P. bidentatus* was determined in all plots in October 2000.

RESULTS

It turned out that in case when the results obtained from all the experimental plots were analysed jointly, no correlation could be found between the length of sections into which stems were cut and the population size of the new generation of beetles, which left stem top sections. In some experimental plots sections with the length of 20 cm proved to be best for the multiplication of *P. bidentatus*, while in other experimental plots new generation beetles were found in biggest numbers on stem tops uncut into shorter sections (Table 1).

It may be stated that the shortest sections – with the length of 20 cm – were colonized by the biggest numbers of beetles in those stands, in which thinnings were performed in such periods, which resulted on intensive release of terpenes during swarming of *P. bidentatus*. After thinning procedures performed in March and in July bark beetles preferred stem tops cut into very short sections, colonizing uncut stem tops lying nearby in relatively low numbers (Table 1).

Table 1. The number of exit holes of *Pityogenes bidentatus* per 1 m stem lengthTabela 1. Liczba otworów wylotowych *Pityogenes bidentatus* w przeliczeniu na 1 m długości strzały

Thinning date Termin trzebieży	Cutting into sections, cm Rozdrobnienie na odcinki, cm			Uncut stem top Strzała bez rozdrobnienia
	20	50	100	
July – lipiec 1999	33.5	18.1	–	2.2
March – marzec 2000	22.5	3.9	–	7.7
March – marzec 2000	22.3	9.6	6.8	3.2
March – marzec 2000	22.5	5.3	9.1	1.8
Mean July, March Średnio lipiec, marzec	25.2	9.2	8.0	3.7
August – sierpień 1999	0.1	7.2	–	0.6
December – grudzień 1999	11.2	8.8	–	32.9
January – styczeń 2000	6.5	10.0	–	45.2
Mean August-January Średnio sierpień-styczeń	5.9	8.7	–	26.2

In contrast, after thinning performed in August, December and January thinning residue could be colonized by beetles only in spring, after several months of dormancy in the forest. In that case bark beetles generally seemed to prefer uncut stem tops.

CONCLUSIONS

1. Cutting thinning residue into sections of 20 and 50 cm in case of those tending interventions performed during the swarming of *Pityogenes bidentatus* increases the development possibility of bark beetles in this material.

2. Cutting thinning residue into small section in case of thinnings performed on dates distant from swarming periods probably limits the development possibility of *Pityogenes bidentatus*.

3. Leaving in the forest thinning residue cut into short sections may not be considered a protective measure. After further investigations have been performed, this procedure may prove to be worth recommending after autumn and early winter thinnings.

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**PRÓBA OKREŚLENIA WPŁYWU ROZDROBNIENIA
POZOSTAŁOŚCI POTRZEBIEŻOWYCH
NA MOŻLIWOŚCI ROZWOJU *PITYOGENES BIDENTATUS*
(*COLEOPTERA, CURCULIONIDAE*)
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Streszczenie. Celem pracy było zbadanie zależności między stopniem rozdrobnienia cienkich fragmentów strzał sosny a liczebnością młodych chrząszczy *Pityogenes bidentatus*, które rozwinęły się na tym materiale. Powierzchnie doświadczalne założono w siedmiu drzewostanach *Pinus sylvestris*. Po trzebieży pozostawiono na ziemi górne, cienkie fragmenty strzał. Niektóre z nich pocięto na odcinki o długości 20, 50 i 100 cm. Wyniki badań wskazują, że w wypadku wykonywania trzebieży w okresie wiosenno-letnim jest bardzo prawdopodobne, iż na strzałach pociętych na krótkie odcinki rozwija się więcej osobników *Pityogenes bidentatus* niż na strzałach pozostawionych w całości.

Słowa kluczowe: *Pityogenes bidentatus*, ochrona lasu, rozdrabnianie drewna

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