

# Population assessment of *Ips typographus* in spruce logging debris

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*Ips typographus* is one of the most damaging spruce bark beetles (Christiansen & Bakke, 1988) in Europe (Wermelinger, 2004), causing mass dieback over large areas especially in Europe (Kausrud *et al.*, 2012). In recent decades climate change has been observed impacting forests, especially coniferous forests. These climatic changes can significantly influence the phenology of the studied pest by increasing the number of generations per year (Faccoli, 2009), earlier onset of flight in spring, intensification of gnawing, especially due to increasing temperatures as well as amplification of drought phenomena (Jakoby *et al.*, 2019). In addition, strong winds can cause massive felling of trees which, if not immediately removed from the forest, are preferred breeding sites for bark beetles. After a blowdown, there is a perfect linear correlation between the number of windthrown trees colonized by bark beetles and the number of standing trees that have dried out due to bark beetle attack within 4 years of the event (Schroeder & Lindelöw, 2002). In addition, the debris resulting from tree felling can be favourable for bark beetle development (Fora *et al.*, 2015). The present paper aims to present experimental results on the assessment of *Ips typographus* populations resulting from logging debris of a forest clearcut using pheromone traps.

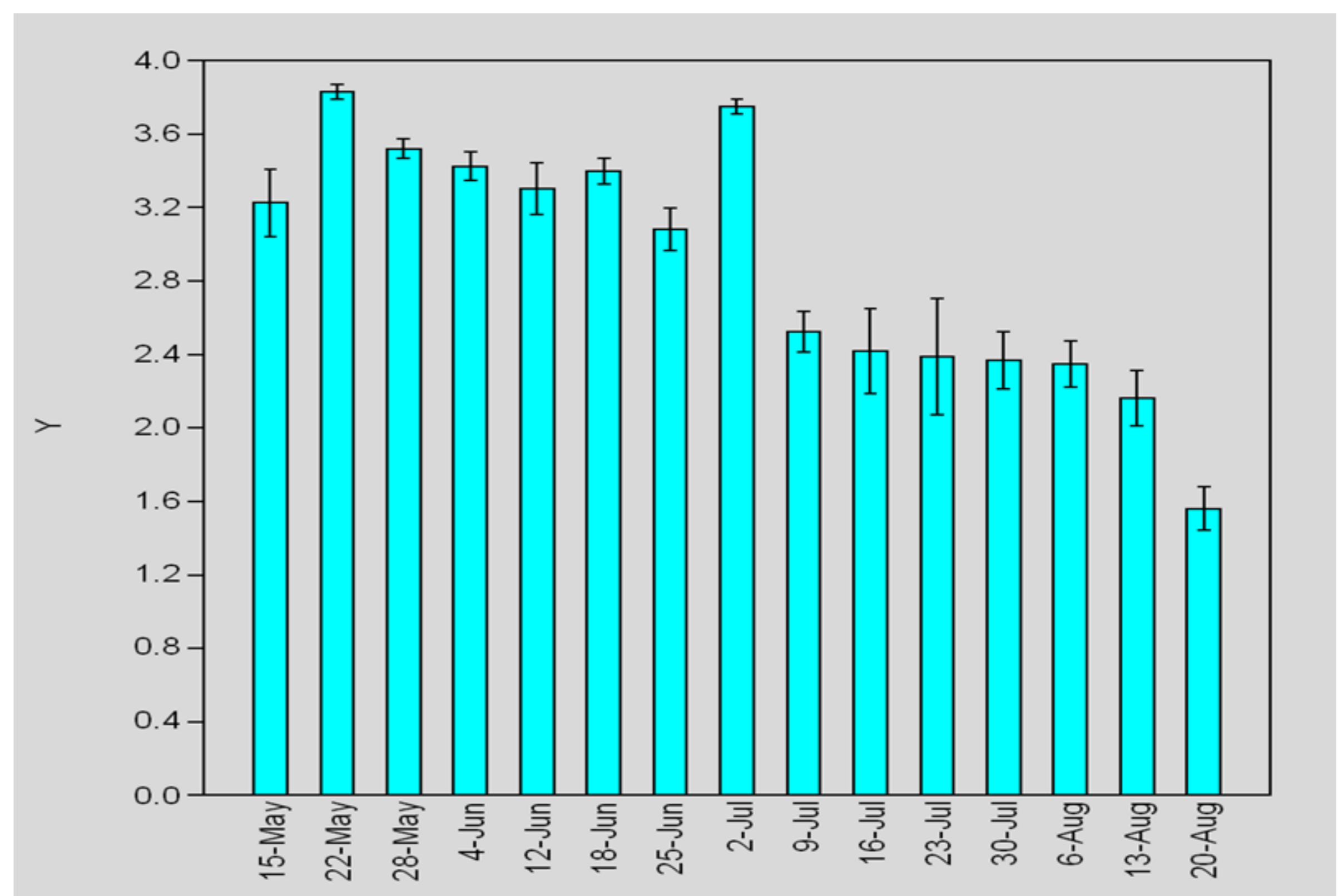
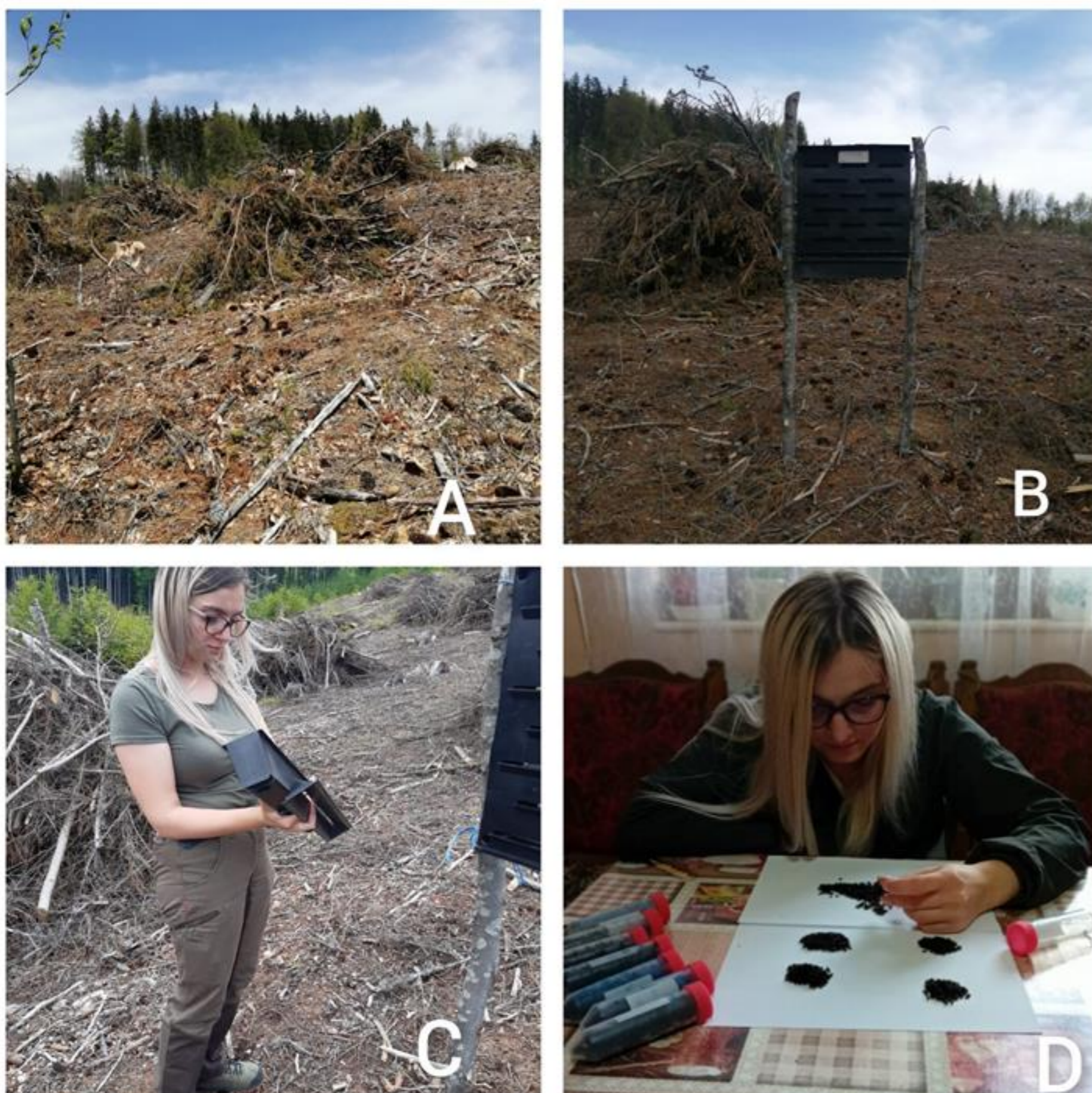
## Material and Method

**Research area.** The research was carried out in Geogiu Forestry Park, production unit V Măgureni, plot 165F (coordinates: N 45.679925; E 23.292368). The composition of the stand was 85% spruce and 15% beech, with an average age of 105 years and a consistency of 0.8. The stand was located at an elevation of 1238 m on SE exposure. The 3-ha stand was clearcut in winter 2021.

**Collection of beetles.** Four Theysohn traps baited with the synthetic pheromone AtraTyp were set in the forest floor in the spring of 2022, on May 8, to capture *Ips typographus* beetles resulting from logging debris (Figure A). The traps were placed in close proximity to piles of tops and branches, 50 m apart and about 25 m from the forest edge (Figure B). Each pile was approximately 2 m long, 1 m wide, and 1 m high. The average number of piles around a pheromone trap set within an average radius of 25 m was 28.75. Each row was placed on two stakes at a height of approximately 1.5 m above the ground. Pheromone nests were changed every 4-6 weeks. Captures were collected at 7-8-day intervals until September (Figure C). Captured beetles were placed in plastic tubes over which 95° ethyl alcohol was added. The tubes were annotated with the place and date of collection and were kept until analysis in the freezer. Analysis consisted of separating *Ips typographus* beetles from impurities and other non-target species and counting them (Figure D).

**Data analyses.** The data were normally distributed, therefore ANOVA followed by Tukey's test was used to compare the experimental variants using the mean catches from the four replicates. The analysis was performed in PAST, version 4.02.

## Results and discussions



Catch status of *Ips typographus* by collection date in 2022

Total catches amounted to 115,220 beetles over the entire experimental period, demonstrating that the pest population level was very high in the study area. The first captures were obtained between 8 and 15 May, as early as the first week after the pheromone trails were installed. The spring flight accounted for 69.2% of the entire experimental period, peaking between 16 and 22 May (representing 23.7% of the entire season), thus falling within the range of 50-75% of the entire year's flight indicated by Simionescu (1987). The summer flight accounted for 30.8% of the entire experimental period, peaking between 26 June and 2 July (representing 19.8% of the entire season). Thus, 43.5% of the total number of beetles were caught during the two peak flight periods. The last catches were recorded at the end of August. There were no significant differences between the catches obtained in the 4 pheromonal runs, significant differences were only obtained between the collection dates.

The ratio of the total number of beetles caught to the total volume of the mining debris in the piles in the sphere of influence of the pheromone traps, over than 500 beetles were caught from 1 m<sup>3</sup> of logging debris.

## Selective references

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