Monitoring *Hylobius abietis* (L.) (Col., Curculionidae) by baited pitfall traps in relation to planting and treatment of seedlings in a re-forested area

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With one figure and 3 tables

**Abstract**

The method of standardized baited pitfall traps for monitoring population of *Hylobius abietis* (L.) was experimentally included into the routine planting and control schedule (model area) in the Czech Republic. It is recommended to determine characteristics of the area on the basis of long-term monitoring. A short-term prognosis per site must be drawn from monitoring done from the earliest beginning of the season. However, it seems advisable to treat all the individual seedlings immediately after they have been planted in the area where the over-all characteristics (ascertained by monitoring) indicate generally high population levels. To base a decision for treatment on the percentage of seedlings attacked (feeding scars) per site is considered unadvisable in comparison with data obtained by monitoring using baited pitfall traps. Insecticides for the treatment of newly planted seedlings need to be applied to two-thirds of the trunk of a seedling (including the root collar), their action should be fast enough to paralyse (kill) the weevils before they reach xylem by feeding and, furthermore, the residues should be effective up to the end of the season.

**1 Introduction**

The large pine weevil, *Hylobius abietis* (L.) is one of the key pests causing difficulties in reforestation in many European countries. Monitoring of the weevil populations by standardized baited pitfall traps in Sweden (NORDLANDER, 1987) has been one of the apparently useful approaches to prognosis, possibly also to some control measures against the pest. We have employed this method, with some alterations, in several lines of research in the Czech Republic.

The present account is a model of implementation of the monitoring by baited pitfall traps in the routine planting and control schedule, including some recommendations for management of the pest.

**2 Material and methods**

**2.1 Localities and area**

The main studies were conducted in an extensively managed forest area "Blanský les" (nr. Dobčice), about 20 km W of České Budějovice, southern Bohemia, Czech Republic in 1993. Pino-Fagetum forest association in the altitude of about 700 m. A less important area was close to Pacov (Holýšov), about 90 km NE of České Budějovice, Pino-Piceetum forest association, in the altitude of about 450 m. One-year-old clearings were selected in both areas.

**2.2 Monitoring method**

In principle, baited pitfall traps with alpha-pinene, 96% ethanol (volume ratio 1:2) and water as lures (NORDLANDER, 1987) were used. Some alterations of the traps made by STARÝ et al. (1994; MAXI baited pitfall traps) were followed: White, opaque, 15-litre plastic buckets, capped with lids of the same material, were used. A number of 7 mm holes were drilled at 5 cm distances around the whole circumference of the bucket, one centimeter below the margin. The bait fluids, i.e., 100 ml of alpha-pinene and 200 ml of 96% ethanol were separated in two 0.5-liter open plastic bottles placed on the bottom of the trap, where an approximately 2 cm layer of water was poured, too. The traps were placed in the ground with the holes more or less at the ground level. Five traps were used for a trial, and the traps were spaced 10 m apart in a row in a clearing, about 10 m from the forest edge. The samples of weevils caught were taken at almost regular weekly intervals throughout the season, or during its part where necessary (for details of the method see ZUMR et al., 1994).

**2.3 Pesticides and residual efficacy**

Vaztak 10 EC (produced by SPOLANA Neratovice, Czech Republic; effective compound 10% aphametrin), a synthetic, contact & systemic pyrethroid was applied at a 0.5% concentration and with a coloured detergent SCOLYCID D. It is stable when exposed to light and its solubility in water is low, so that there is a significant reduction of the time interval between the application and true contamination of the target pest. The insecticide was applied by spraying the basal third to two thirds of the seedling, avoiding the terminal (already growing) parts (for the characteristics see MRÁČEK, 1986). The coloured detergent was useful in enabling us to distinguish easily the treated parts of the seedling.

Both the actual and residual efficacy of the insecticide was tested in the laboratory. Cut pieces of the trunk of a treated spruce seedling, 15 cm long, were placed in 20 cm Petri dishes with sterilized coarse sand on the bottom (to allow the weevils to return to normal position) together with a piece of wet cotton wool as a source of water for the weevils. In each Petri dish, 30 live weevils (starving for one day prior to the trial) were tested and the effects of the treated food on their behaviour (paralysis) and mortality were examined. Tests were made under laboratory conditions (+18–20° C temperature and 18-h photophase, fluorescent light).


3 Results

3.1 Locality: Dobče

The site at Dobče was a long clearing consisting of two longitudinal belts 20 m wide and more than 300 m long, separated by a narrow belt of an old, uncut forest about 100 years old. The site was on the eastern slope of a hill.

Five traps were installed 10 m apart in a row in each of the two belts. In the control site, Dobče-I (fig. 1), the traps were set prior to the seasonal occurrence of the weevils, whereas the set of traps at Dobče-II (treated) was installed just after the treatment. There were many naturally dispersed young spruce and pine seedlings at Dobče-II, but there were none in the Dobče-I site.

Seedlings were planted about May 7 and, reportedly, they had been treated with an unknown insecticide in the nursery. Their density was approximately 15 seedlings per row, i.e., about 100 seedlings per 1.5 are.

The degree of damage to the seedlings was derived from the counts of three rows at the level of each of the traps. The seedlings were checked for the presence/absence of feeding scars. A high incidence of the feeding scars on the planted seedlings was determined during an inspection a week after the planting (May 14).

The data on the control site, Dobče-I are presented in table 1. The evidence of damage to seedlings planted at Dobče-II is presented in table 2.

The naturally dispersed young seedlings at Dobče-II manifested the following damage (table 3).

It is apparent from table 2 that the proportion of damage was very high at the site Dobče-II. Because of the Forestry Regulation ON 48 2712 (1988) that prescribes treatment in case that more than 20% of the seedlings checked are injured by weevils, the individual seedlings were treated with VAZTAK 10 EC about 3 days (May 17) after the inspection, i.e., about 10 days after the planting.

The effects of the treatment on the weevil population monitored as well as its further development are presented in fig. 1-B. The results of laboratory observations on the effects of the treatment and residues on the individual adult weevils were as follows:

Feeding on the treated trunks, i.e., their cut pieces was found soon to be followed by gradual paralysis that started by asynchronic movements of the legs, falling of the adults to the ground, their inability to turn over from a...