IMPROVED TECHNIQUES FOR THE LABORATORY REARING OF THANASIMUS FORMICARIUS

W. FAULDS
Ministry of Forestry, Forest Research Institute, Private Bag, Rotorua, New Zealand

(Received for publication 3 March 1987; revision 2 May 1987)

ABSTRACT

An improved rearing method for **Thanasimus formicarius** L. (Col: Cleridae) involved transferring larvae hatched from eggs laid **in vitro** into bark-beetle-infested billets. This technique is particularly useful in quarantine conditions. In addition, the successful long-term cool storage of reared adults greatly improved the efficiency of the rearing programme.

Keywords: rearing techniques; storage; cold storage; **Thanasimus formicarius**; **Hylastes ater**; **Hylurgus ligniperda**.

INTRODUCTION

The first *Thanasimus formicarius* sent to New Zealand arrived in September 1976. A breeding and rearing method, the record of imports, and the reasons for importing this clerid beetle as a possible control measure for *Hylastes ater* (Paykull) and *Hylurgus ligniperda* (Fabr.) have been described by Zondag (1979). The most difficult part of Zondag's method was the time-consuming job of recovering the "imported" beetles before the rearing billets were removed from the quarantine facility. Another major problem was obtaining the large numbers of bark beetles required for the twice-weekly feeding of reared clerid adults, which were stored at approximately 18°C in glass jars (eight of each sex per jar) until they were released in the forest or used for further breeding.

The possibility of an improved rearing technique to overcome the first of these problems became apparent when it was noticed that the adults stored in glass jars would mate and lay eggs in these containers. This meant that billets could be seeded with newly hatched *T. formicarius* larvae, as opposed to Zondag's method of exposing the billets to adults. At the same time, the survival of reared adults in cold storage, with only occasional feeding, was tested as a possible alternative to Zondag's method of storing reared adults.

REARING

On 6 October 1983 five female and five male *T. formicarius* adults were placed in a 90-mm-diameter × 100-mm-high glass jar containing crumpled paper towelling and with a wire gauze lid for ventilation. *Hylastes ater* and *Hylurgus ligniperda* adults were

added every 3–4 days as a food supply. After 18 days, clerid eggs were seen in the jar and were removed on to a black paper disc in a 90-mm petri dish. Black paper allowed the white eggs and hatching larvae to be seen easily. A few drops of water were added every 2 days to a filter paper placed under the disc. The jar was thereafter inspected every 3–5 days and any eggs present were removed and treated in the same way. Eggs took up to 14 days to hatch. Newly hatched larvae were picked out of the petri dish with a small brush and placed in bark beetle holes in *Pinus nigra* Arnold billets. These billets had been prepared as described by Zondag (1979). Altogether six billets were seeded with first instar *T. formicarius* larvae and stored in a room at 18°C. All larvae were seeded into the billets on 21 October except for a total of five larvae seeded into Billet 1 on 13 and 17 October. The bark was removed from Billet 1 on 8 November, Billets 2 and 3 on 18 November, Billet 4 on 24 November, Billet 5 on 5 December, and Billet 6 on 4 January 1984. Clerid larvae recovered were measured and preserved. The number of first instar larvae seeded into each billet and the number and length of the larvae recovered are presented in Table 1.

STORAGE

Freshly emerged adults reared in insectaries for field releaes or further breeding, were kept individually in 50 × 25-mm glass tubes closed with a plastic stopper with two small air holes. A small strip of coarse paper was included to provide an easy surface for the beetle to walk on. Each adult was fed with three or four bark beetles. After 2 days the bark beetle remains were removed, to prevent fungal growth, and the tubes were stored in a cool room at 4°C. Every 3 months (approximately) these adults were taken out of the cool room, fed with bark beetles for 3 days, and then returned to storage after bark beetle remains were removed from the tube. From late March until early December 1984, 903 clerids were stored in the cool room and total deaths numbered 38 (4.2%), of which 29 occurred between March and June. Cool storage had no apparent adverse effects on fecundity. Most adults used for breeding since 1983 have been kept in cool storage.

DISCUSSION

Development of the larvae in the billets demonstrates that *T. formicarius* can be successfully reared by this technique. Although only one adult was reared (from the recovered pupa) the fully grown resting larvae in their pupal chambers would certainly have proceeded through to adults if they had been left undisturbed. The main advantage of this technique is apparent when *T. formicarius* is reared in quarantine conditions where every imported adult must be accounted for. The time-consuming job of searching the billets for adults is eliminated and there is less possibility of them escaping. Other advantages of this technique are that the number of clerid larvae per billet can be controlled and that egg production can be halted by returning the jars of adults to the cool store.

No comparison of mortality can be made between the cool room method and Zondag's method of storing emerged adults as no record of mortality was kept by Zondag. However, the 4.2% mortality in cool storage seems very reasonable considering

TABLE 1—Recoveries of *Thanasimus formicarius* larvae seeded as first instars into bark beetle holes in *Pinus nigra* billets

Billet	No. of larvae seeded	Time from seeding to recovery (days)	Damaged	No. of larvae recovered by length (mm)														In bark* chamber	Total recovered
				5	8	9	10	11	12	13	14	15	16	17	18	19	20		
1	18	18–26		5		1	3	2	4										15
2	11	28		1			1		1	2	1	2	1	2					11
3	15	28	1				1	2	2		3	2	3	1					15
4	12	34		1									4		1	1	1	3	11
5	16	45		1	1		2		1			1	2					8	16
6	14	75																9†	9†

* The larvae recovered from chambers in the bark were fully grown and would have remained in their chambers until pupation and emergence as adults

† Including one pupa

the effort saved by having to feed the adults only every 3 months. The fact that adults kept in jars at room temperature will lay eggs, also suggests that some of the adults stored this way by Zondag would have laid many of their eggs before being released in the forest.

REFERENCE

ZONDAG, R. 1979: Breeding of the clerid **Thanasimus formicarius** for the control of the bark beetles **Hylastes ater** and **Hylurgus ligniperda** in New Zealand. **New Zealand Journal of Forestry Science 9(2):** 125–32.