NOTE

EVALUATION OF A REPELLENT FOR PREVENTION OF ATTACKS BY THREE SPECIES OF SOUTHERN PINE BARK BEETLES (COLEOPTERA: SCOLYTIDAE)

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Pines with high monetary or aesthetic values are frequently protected from bark beetle attacks by pesticides. Although pesticides can be highly effective for prevention of bark beetle attacks, humans and other nontarget organisms may be exposed to these toxicants. The availability of a low toxicity bark beetle repellant or antifeedant which provides long-term protection is desirable.

During 1982 and 1983 we tested a pine oil-based material, BBR-2 (Safer Agro-Chem Ltd., Victoria, BC, Canada) for prevention of attack by 3 common species of southern pine bark beetles. Similar materials have been reported to be effective for prevention or reduction of attacks by the ambrosia beetle *Trypodendron lineatum* (Olivier) (Nijholt 1980, Canad. Entomol. 112: 195-204) and three species of bark beetles, *Dendroctonus* spp. (Nijholt et al. 1981, Canad. Entomol. 113: 337-340). Subsequently, O'Donnell et al. 1986 (J. Entomol. Sci. 21: 319-21) reported that a similar material (Northwest Petrochemical Corporation, Norpine 65) reduced landing and delayed attacks on attractant-baited trees by the southern pine beetle, *Dendroctonus frontalis* Zimmermann.

We evaluated the efficacy of BBR-2 against the southern pine beetle (SPB), *Dendroctonus frontalis,* the black turpentine beetle (BTB), *D. terebrans* Olivier, and the engraver beetle, *Ips grandicollis* (Eichhoff).

Southern Pine Beetle — The basal 4 m of 30 loblolly pines, *Pinus taeda* L., were sprayed with a hydraulic sprayer at ca. 20 kg/cm^2 pressure with undiluted BBR-2 until the bark was thoroughly wet. The trees were 11 - 15 cm DBH and were ca. 10 m in height. Each tree received ca. 3 liters of spray. On the day following application, 4 trees were felled and a 1.5 m bolt was removed from each tree 1 m from the base. The bolts were transported to an active SPB infestation and deployed and baited according to the technique of Berisford et al. (1980, J. Econ. Entomol. 73: 694-697). Each bolt was baited with 1 ml of the SPB attractant "frontalure" and a 20 × 50 cm sticky trap was attached to each bolt to monitor beetle visitation. Tests were evaluated after two weeks and a 1000 cm^2 area on each bolt was peeled to determine numbers of attacks and lengths of SPB egg galleries. The test was repeated two months later with different bolts from the original 30 treated trees.

All of the bolts were visited by SPBs with means of 26.0 and 40.7 beetles trapped on treated and check bolts respectively. There were no attacks on the treated bolts. Untreated check bolts had means of 44.7 attacks and 254.2 cm of egg gallery/1000 cm^2.

Sixty four SPBs were trapped in the test at two months posttreatment. Two of the four checks had been attacked (18 and 11 attacks/1000cm^2) and there were no attacks on any treated bolts. This indicates some repellency after two months but beetle activity was also low.

Black Turpentine Beetle — We conducted three tests on this pest. The first was in Pierce Co., GA, during September - November, 1982. Eighty-one slash pines, *P. elliottii elliottii* (Englemann), were sprayed to run-off with BBR-2 on the basal 1.5 m with hand held Hudson® sprayers at ca. 3 kg/cm^2 pressure. Each tree received ca. 0.5 liters of undiluted repellant. Eighty-one trees in the same rows were designated as untreated checks. Check trees were separated from treated trees by another untreated tree. Efficacy was determined 2 months after treatment by counting BTB pitch tubes.

Two tests were conducted in 1983 in Baker Co., FL. In the first test, fifty slash pines were treated with 4% paraquat on wounds 2.54 cm × 1/3 of the tree circumference to invite BTB attacks. Twenty-five of these trees were randomly selected and sprayed with undiluted BBR-2 to a height of 0.9 m on the day prior to paraquat treatment. Numbers of BTB attacks were recorded biweekly from mid-July through December.

In the final test, we determined if BBR-2 could reduce BTB catches in turpentine-baited traps. Twelve traps with vertical bounce columns (Fatzinger 1985. *In* Brannon and Thatcher, Eds. U. S. Dept. Agr. For. Serv. Gen. Tech. Rept. SO-56: 26-31) were baited with turpentine and deployed in a single line at ca. 9 m intervals in a slash pine seed production area. Four pieces of cotton rope (1.27/, × 0.9 m) were saturated with BBR-2 and hung from the bounce column of alternate traps. The ropes were retreated weekly. The remaining 6 traps served as checks. Traps were checked weekly from July 22 through October 12 and numbers of BTBs trapped were recorded. Data were analyzed by ANOVA for differences between catches in treated and check traps.

There was no evidence that BBR-2 repelled turpentine beetles. There was, in fact, an indication that it was attractive. Of 21 trees attacked by BTBs in the first test, 20 had been treated with the repellant.

BTB attacks occurred on 17 of the 50 trees wounded and treated with paraquat in the 2nd test. Nine treated trees and 8 checks were attacked.

Traps with the BBR-2-soaked ropes surrounding the bounce column caught 528 BTBs, compared with 425 BTBs in check traps. These catches were not significantly different.

Ips grandicollis — Tests were made by the technique of Berisford and Brady (1976. J. Econ. Entomol. 69: 357-8). Twenty trees were each sprayed with ca. 2 liters of undiluted BBR-2 using a hydraulic sprayer at ca. 20 kg/cm^2 pressure. Trees were treated on the basal 3 m until the bark was wet. On the following day, four treated trees and four untreated checks were felled. Counts of the numbers of attacks (nuptial chambers) were made on a 1000 cm^2 area (50 cm × 20 cm) of each tree at 2 m from the base 5 days after felling.

All of the trees felled were heavily attacked by *Ips grandicollis.* Treated trees and checks had means of 15.2 and 14.7 attacks/1000 cm^2 respectively. Since the tests showed that BBR-2 was ineffective against *I. grandicollis* immediately following application the test was terminated.

This material can prevent SPB attacks at least for a short time, but the failure to prevent *I. grandicollis* and BTB attacks reduces its potential utility. Also, phytotoxicity which we observed on the leaves of nontarget plants might further restrict its use.

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