

Bracken fern control with several herbicides

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Bracken fern is a world-wide species which often dominates pastures and rangeland. It is also an early invader of forest regeneration areas. Its global distribution has been attributed to wide climatic and soil adaptation and strong competitive ability.

Bracken fern is known to produce phytotoxins that disturb the normal development of other plants, insects, and animals. A disease in cattle is caused by a lethal poison produced in bracken fern (W. F. H. Jarrett, "Esophageal and stomach cancer in cattle," *Brit. J. Cancer*,

1973). Several researchers have demonstrated that bracken fern contains a carcinogenic substance which produces malignancies in a diverse number of animal species (I. A. Evans, B. Widdop, R. S. Jones, G. D. Barber, H. Leach, D. L. Jones, and R. Mainwaring-Burton, "The possible human hazard of the naturally occurring bracken carcinogen," *Biochem. J.*, 1971; and C. Y. Wang, A. M. Pamukcu, and G. T. Bryan, "Detection of carcinogenic activity in different extracts of bracken fern," *Proc. Ann. Assoc. Cancer Res.*, 1973). Transfer through milk has been established by I. A. Evans, R. S. Jones, and R. Mainwaring-Burton ("Passage of bracken fern toxicity into milk," *Nature*, 1972), but whether the carcinogen is transmitted through meat is not clear.

These studies are especially significant for people who consume bracken fern directly as well as for livestock and dairy producers. Numerous methods of bracken-fern control have been tested: controlled fire, mechanical removal, tillage, and herbicides are some examples. However, little success has been achieved with any method.

Experimental procedure

Four separate experiments were established from May 23, 1974 through August 28, 1975 in Mendocino County to compare the effectiveness of three herbicides for bracken fern control. Herbicides studies were dicamba (Banvel), glyphosate (Roundup), and asulam (Asulox). All herbicide treatments were made to fully expanded fronds in either 200 ft² or 400 ft² plots. Bracken fern density (stand) and fresh weight reduction were determined after 10 to 25 months from application.

Herbicide effects

Of the three herbicides tested, dicamba provided the least bracken fern

control. At the lowest application rate (1 lb/A) neither stand nor fresh weights were reduced by more than 31 percent of the non-herbicide treated control (fig. 1). A higher rate (2 lb/A) of dicamba did not appreciably increase the amount of bracken fern controlled.

Bracken fern was effectively controlled by either glyphosate or asulam. Applications of glyphosate resulted in 96 to 100 percent stand reduction and 98 to 100 percent decreased fresh weights (fig. 1). Significant reductions in bracken fern stand (88 to 92 percent) and fresh weights (83 to 93 percent) also occurred with asulam (fig. 1). In contrast to glyphosate, where necrosis of exposed fronds occurred rapidly after application, asulam-treated plants did not die for several months after application. However, the following spring new fronds did not emerge from the asulam-treated areas. No bracken fern regrowth was observed in plots treated with either herbicide after 25 months.

In these study sites grasses and forbs were generally missing. This is due to the extensive canopy and competitive effects of bracken fern on other plants. Phytotoxicity to treated grasses and forbs from glyphosate was minimized by making applications in late May when most annual grasses and forbs had matured. It is apparent from these studies that either glyphosate or asulam provide an effective means for the control of bracken fern. Asulam is registered for bracken fern control in forestry; however, asulam, dicamba, and glyphosate are not currently registered for use in rangeland.

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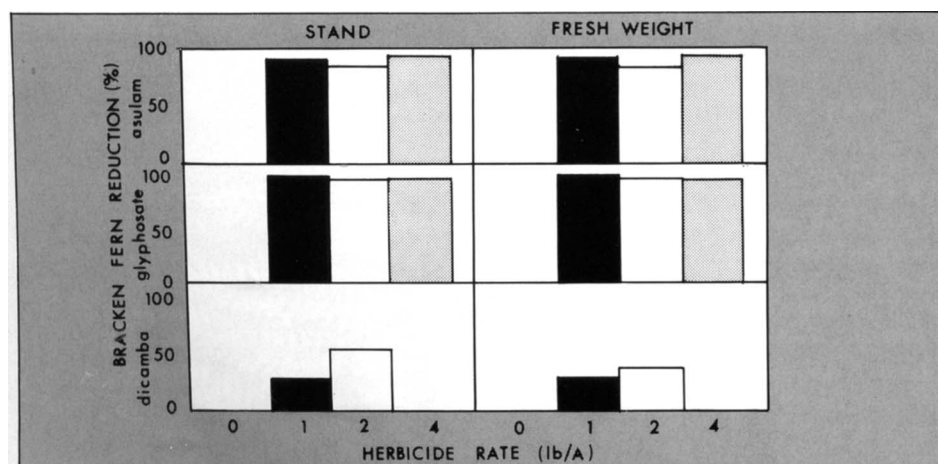


Fig. 1. Bracken fern control with three herbicides.