Downslope Movement and Efficacy of Hexazinone in the SBS Zone

Incidents of downslope movement of hexazinone in the Prince Rupert Forest Region in 1985 and 1986 underscored the need for further trials to understand how hexazinone moves and to fine-tune the existing application guidelines.

Hexazinone is applied directly to the soil surface by a spot or broadcast spray. It is water soluble and soil mobile, being transported by soil water to the roots of the target plants. Performance increases on moist soils but, if the site is continuously wet, off-site movement can occur. Familiarity with site specific environmental conditions such as soil moisture, soil temperature, rainfall and snowmelts regimes as well as soil texture and organic matter content, is important to achieve maximum benefit from hexazinone and minimize risks to non-target species.

A study, located in the SBS zone near Smithers, investigates the environmental/site processes that induce off-site movement and determines efficacy and crop tree tolerance. Twelve treatments combine three rates and two time periods of application on two soil types.

Hexazinone in the liquid formulation (Velpar L) was applied at three rates: 2ml/spot at 1m x 1m spacing; 4ml/spot at 1.5m x 1.5m spacing; and, 6ml/spot at 2m x 2m spacing. Twelve plots were treated in late May and twelve plots in early October 1987. These two application periods test the effects of two very different soil climate conditions on efficacy and downslope movement. During spring, soils are generally warm and moist, becoming warmer and drier as the season progresses into summer. However, during fall, soils are cool and wet, generally freezing shortly after chemical application, causing a slowing down of hexazinone biodegradation. Come spring the soils will be submitted to snowmelt and subsequent saturation and extensive surface and subsurface runoff. Study of the fate of hexazinone under these two applications regimes will help define the time periods that are acceptable for Velpar L application in the SBS zone.

Soil organic matter influences the fate of hexazinone, therefore two different soil types were selected to provide additional information. At the site near Moricetown (SBS/06), the average surface organic layer is 15 - 20 cm, whereas at the site near Houston (SBSd/01), the soil is drier with an average organic layer of 1 - 2 cm.

Preliminary observations of permanently staked sample plots suggest that efficacy is improved in moist soils. All treatments on the drier site showed poor performance until the onset of rain, whereas on the moist SBS site, acceptable vegetation control was achieved soon after treatment. Vegetation control was best on the closely spaced (1m x 1m) treatments on both soil types.

Downslope movement of hexazinone is measured for each experimental plot by collecting surface and subsurface soil water and assessing chemical damage to vegetation at fixed distances downslope. Preliminary results of chemical analysis of 50 of these water samples indicate that hexazinone moved predominately as shallow subsurface interflow and that downslope movement was generally confined to 7 - 10 m. Downslope vegetation assessment showed damage on one of the spring application plots at a distance greater than 10 m. Because soil water flows most abundantly in the late fall and early spring, damage from downslope movement, if it occurs, will be more apparent in the 1988 growing season.

Information from continuous environmental monitoring (air and soil temperature, rainfall and snowmelts, soil moisture, solar radiation), from water sampling, and from vegetation measurements will be analysed over this winter. The site will continue to be monitored through 1988 and 1989, and the collected information included in the analysis. This long term information is needed because of the residual nature of hexazinone. From this study will come information to help determine the environmental fate of hexazinone in the SBS zone, understand factors effecting its movement, and predict its behaviour on other sites.

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