

Understanding the behaviour of dazomet in dryland broad acre field situations

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Summary Dazomet is a granular soil fumigant, which reacts with water to produce methyl isothiocyanate (MITC) gas. Dazomet is typically used as a pre-planting treatment to control soil fungi, insects and nematodes and germinating weed seeds. Application of dazomet is often followed by irrigation to ensure that there is adequate water for the dazomet to react, and to seal the soil surface to maximise the exposure time of soil organisms to MITC. Alternatively, the soil surface may be sealed with plastic sheeting or by rolling the site with a heavy roller, in order to trap the MITC within the soil profile and prevent the soil drying out during treatment.

The Branched Broomrape Eradication Program, a national program to eradicate *Orobanche ramosa* L. (branched broomrape), utilises dazomet as a fumigant to actively destroy the existing branched broomrape seed bank. Additionally, when present in low concentrations, MITC can induce suicidal germination of seeds in the absence of a viable host. Dazomet was applied with a 24-foot airseeder equipped with Morris tynes attached at 9" spacing and 10" sweeps. Specialised seeding boots equipped with spreader plates to disperse the fumigant were attached. This equipment operated over large areas quickly and dispersed the fumigant powder in an even band at the desired depth. After treatment, sites were immediately rolled to retain as much moisture and fumigant in the soil profile as possible. In 2006, the first year of broad-scale application with this equipment, 270 ha of dazomet was applied in paddocks known to contain a seed bank of branched broomrape. In 2007, 432 ha was treated with dazomet.

Within the branched broomrape quarantine area, the predominate landuse is dryland farming and irrigation is not available to activate MITC production or seal the soil surface. It is also unfeasible to cover the treated area with plastic sheeting. In this situation the conditions suitable for application of dazomet are limited to autumn, after the soil has been moistened

from break-of-season rainfall and the soil temperature is still warm enough for dazomet to react. Because these application conditions are not typical for dazomet a field trial was established to investigate how long the dazomet took to react, the concentration of MITC released and the effect of the MITC on the viability of branched broomrape seed.

The field trial was conducted in May 2007. Dazomet was applied at 112.8 kg ha⁻¹ and 338.4 kg ha⁻¹ at 10 cm soil depth and compared to untreated control plots. The trial was repeated at three sites.

The volatilisation of MITC from soil was captured in soil samples and soil air samples (extracted onto ORBO 32 activated charcoal tubes). These samples were collected prior to treatment, immediately after rolling, and at 1, 2, 4 and 7 days after dazomet application.

The lethal dose exposures required for branched broomrape seed was investigated by retrieving buried branched broomrape seeds following treatment. Since the branched broomrape seeds are tiny (approximately 0.2 mm long) nylon sachets containing branched broomrape seeds and sand were constructed and buried at 5 cm depth immediately following the application of dazomet. The sachets were exhumed after 1, 2, 4 and 7 days of exposure to MITC.

MITC was extracted from the soil samples with ethyl acetate, and from the charcoal tubes with carbon disulfide, then analysed by mass spectrometry. These data allowed for the accurate calculation of MITC concentration over time post-treatment.

The seeds removed from the buried sachets were assessed for germination and viability. When compared with the exposure data determined from the soil and soil air samples, the lethal dose exposures required for branched broomrape seed will be verified.

At the time of paper submission, the samples were still being processed. Results will be displayed on a poster at the conference.