From Forest Nursery Notes, Winter 2012

302. © Liverwort control using novel techniques. England, J. International Plant Propagators' Society, combined proceedings, 2010, 60:465-470. 2011.

Liverwort Control Using Novel Techniques©

Jill England
ADAS, Battlegate Rd, Boxworth, Cambridgeshire CB23 4NN, UK
Email: jill.england@adas.co.uk

INTRODUCTION

Liverwort growing on the surface of growing media is a major problem in nursery stock production, affecting both protected and outdoor-grown crops: removal has been estimated at 4% of total annual production costs (Scott and Hutchinson, 2001), equivalent to £1,763 per hectare based on Horticultural Business Data 2008–9 figures (Crane and Vaughan, 2009). Zero tolerance of liverwort in certification schemes and a lack of approved chemical products make its control a technical priority for growers. This paper reports on a project funded by the Horticultural Development Company (HDC) to investigate the herbicidal effect on liverwort of glucosinolate hydrolysis products found in oil seeds, and the suppression of liverwort growth by unknown biological or physical factors within certain growing media components.

Seed Meal Suppressive Effect. Glucosinolates (GSLs) and their hydrolysis products (isothiocyanates, ITCs) are responsible for the distinctive pungent smell and hot taste of cabbages, mustards, and other brassicas and have shown toxicity against root knot nematodes, fungal species, and plants (Bialy et al., 1990). Such GSLs could potentially be used to control liverwort — each brassica species has a distinctive profile of one or more glucosinolates, each of which could have a different effect.

These GSLs are nontoxic thioglucosides with a common core comprised of a β-d-thioglucose group with a sulphonated oxime and a variable side chain ("R" group) that largely determines the biological activities of the degradation products (Brown and Morra, 1999). The hydrolysis of GSL is catalysed by a myrosinase enzyme released following mechanical damage in the presence of water; GSLs and myrosinase are stored separately within the plant and come into contact only following mechanical damage. The products of this reaction are primarily ITCs, thiocyanates, nitriles, or epithionitriles, depending on the "R" group present and environmental conditions (Vaughn et al., 2006). These ITCs are the most bioactive products of GSL hydrolysis and have been shown to exhibit a herbicidal effect on liverwort: ITCs adversely affected liverwort gemmae (vegetative propagules produced by gemma cups on the liverwort surface) comparable to two herbicides (lenacil and metazachlor) when tested under laboratory conditions in a previous HDC project (Jeger, 2008); *Limnanthes alba* seed meal provided short-term liverwort control when incorporated into growing media (HDC project HNS 93c); and *Sinapis alba* 'Ida Gold' applied as a mulch has been found to control established liverwort (Boydston et al., 2008).

Growing Media Suppressive Effect. Observations made by ADAS (formerly Agricultural Development and Advisory Service) consultants during an earlier HDC-funded project (HNS 93c) suggested a suppressive effect on liverwort growth where the growing media was amended with loam or the proprietary wood-fibre-based growing media ingredient Sylvafibre® (Melcourt Industries), possibly indi-