



Agriculture & Horticulture  
DEVELOPMENT BOARD



# Grower Summary

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## HNS 139a

Container Grown HNS: Further crop safety screening of Dual Gold (s-metolachlor) and Sumimax (flumioxazine)

Final 2012

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HDC is a division of the Agriculture and Horticulture Development Board.

**Project Number:** HNS 139a

**Project Title:** Container Grown HNS: Further crop safety screening of Dual Gold (s-metolachlor) and Sumimax (flumioxazine)

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**Industry Representative:** Ian Nelson, Johnsons of Whixley Ltd

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## Headline

Over 100 cultivars of nursery stock have been assessed for tolerance to two new herbicides: Dual Gold (s-metolachlor) and Sumimax (flumioxazine). A large number of species have been identified as tolerant to summer applications of Dual Gold and winter applications of Sumimax, increasing herbicide options available to the hardy nursery stock (HNS) industry.

## Background

At present the HNS industry is dependant on relatively few herbicides and consequently resistant weeds can be a problem. There are limited options for summer treatments to enable control of a full range of weeds. Ronstar 2G (oxadiazon) can be applied after potting and is typically followed with Flexidor 125 (isoxaben). Flexidor 125 however does not control groundsel, willowherb or grasses and has sometimes failed to control pearlwort. Results from HNS 139 showed that Dual Gold could contribute improved control of all of these weeds. Because of the wide range of stock grown in the UK it was suggested that a broader range of crop safety information would be desirable to enable growers to take advantage of this herbicide. Dual Gold can be used on outdoor ornamentals under an Extension of Authorisation for Minor Use (EAMU) 2012/0501, however applications may only be made during the period 1-31 May.

For winter herbicide treatments growers have been largely dependant on Butisan S and Flexidor 125 to clean up and maintain control into the spring. New label restrictions mean that metazachlor products (such as Butisan S or Sultan 50SC) can only be used up to a maximum of 1000 g a.i./ha metazachlor over a three year period on the same site, reducing to around 25% the amount previously used each year and therefore making it less useful as a nursery herbicide. Sumimax has a broad weed control spectrum and could be a potential replacement for winter use but, as with Dual Gold, a broader range of crop safety information would be desirable particularly for evergreens.

This project aimed to provide further crop safety information on a wide variety of container-grown stock treated with Dual Gold and Sumimax, by spraying un-replicated treatment strips across a very broad range of container-grown shrubs. Treatments were applied in addition to the normal nursery herbicide programme then closely monitored for phytotoxicity and any effects scored. Recommendations for treatment are based on these findings.

## Summary

Two trials were carried out on a commercial nursery (Darby Nursery Stock, Norfolk). The aim was to cover example cultivars of all of the main range of hardy nursery stock subjects normally grown on commercial nurseries in the UK and assess their susceptibility or tolerance to applications of Dual Gold and Sumimax.

Experiment one was carried out in summer 2011, with one application of Dual Gold applied at 1.4 L/ha (at 1000 L water/ha) to plots of 1 m<sup>2</sup>. Eighty-nine HNS subjects were sprayed in all between 28<sup>th</sup> June and 11<sup>th</sup> July. These were assessed for any damage or growth effects 2, 6 and 12 weeks after treatment application. Note that the rate of use approved under the EAMU is now 0.78 L/ha, lower than the rate used in this trial. At the time of the experimental application Dual Gold was approved at 1.4 L/ha (label recommendation for Maize) under the Long Term Arrangements for Extension of Use. The EAMU was subsequently granted at a lower rate.

Experiment two was carried out in winter 2011/12, with one application of Sumimax (flumioxazine) being applied at 0.1 L/ha (at 1000 L water/ha) to plots of ~1 m<sup>2</sup>. Ninety-five HNS subjects were sprayed in all on the 17<sup>th</sup> January. These were assessed for any damage or growth effects 2, 6 and 12 weeks after treatment application.

Table 1 provides a summary of all the subjects assessed showing which are tolerant to herbicide applications and which are likely to be damaged by such treatments. With both treatments and timings, the majority of subjects tested showed little or no damage or growth defects as a result of the treatment applications. The exceptions are detailed below

### **Dual Gold**

*Berberis* varieties showed some stunting and leaf cupping initially after treatment but this was short lived with no differences being obvious after 6 weeks. *Buddleja* varieties, 'Lochinch' in particular showed some significant yellowing to foliage still obvious 12 weeks after application. *Cotinus* 'Grace', *Forsythia x intermedia* 'Lynwood Variety', *Hebe* 'Sapphire' and *Jasminum officinale* 'Clotted cream' all showed puckering and distortion of young leaves and tips soon after treatment but subsequently grew away and new leaves were unaffected by week 12. *Kerria japonica* 'Golden Guinea', *Philadelphus* 'Manteau d'Hermine' and *Sambucus nigra* f. *porphyrophylla* 'Eva' showed varying levels of leaf scorch with the *Sambucus* being the worst affected, again all grew away from damage by week 12. *Lonicera japonica* 'Halliana' showed leaf blistering to sprayed leaves but new leaves were unaffected. *Rhus typhina* 'Laciniata' showed some severe stunting initially but recovered well.

## Sumimax

Sumimax was applied when many of the subjects were dormant such that phytotoxic affects in many cases were only observed at the final assessment. Several species showed delayed development and bud break including; *Euonymus fortunei* 'Emerald Gaiety' and 'Silver Queen', *Kerria* 'Golden Guinea', *Pachysandra terminalis* 'Variegata', *Philadelphus* 'Belle Etoile' and *Spiraea* cultivars. *Cytisus* 'Porlock' and *Lonicera nitida* 'Baggesen's Gold' showed some obvious stunting. *Cornus sericea* 'Hedgerows Gold' (v) and *Pelargonium* Angeleyes Bicolor 'Pabicolor' were stunted but also showed leaf purpling and browning. Other species including *Abelia*, *Cistus*, *Euryops*, *Hedera*, *Hypericum*, *Leycesteria*, *Ligustrum*, *Pittosporum*, *Pyracantha*, *Sorbaria* and *Viburnum* showed bronzing, brown flecking and patching to young leaves. Damage was very slight in the case of *Abelia*, *Cistus*, *Hypericum* and *Sorbaria* but was more significant and persistent on *Hedera helix* 'Glacier', *Pittosporum tenuifolium* 'Tom Thumb', *Pyracantha* and evergreen *Viburnum*.

**Table 1.** Tolerance to applications of Dual Gold and Sumimax. (S = Susceptible – unacceptable crop damage can occur - do not treat, MS = Moderately Susceptible – some crop damage may occur but plants normally grow away, T = Tolerant, any damage considered insignificant, - = not tested)

Varieties	Dual Gold (applied summer 2011)	Sumimax (applied winter 2012)
<i>Abelia x grandiflora</i> 'Gold Spot'	T	T
<i>Amelanchier canadensis</i>	T	T
<i>Aucuba japonica</i> 'Crotonoides'	T	-
<i>Aucuba japonica</i> 'Variegata'	-	T
<i>Berberis thunbergii</i> f. <i>atropurpurea</i> 'Admiration'	MS	-
<i>Berberis thunbergii</i> f. <i>atropurpurea</i> 'Atropurpurea Nana'	T	-
<i>Berberis thunbergii</i> f. <i>atropurpurea</i> 'Aurea'	-	T
<i>Berberis darwinii</i>	MS	T
<i>Berberis x ottawensis</i> f. <i>purpurea</i>	T	-
<i>Berberis x stenophylla</i>	-	T
<i>Buddleja alternifolia</i>	MS	-
<i>Buddleja davidii</i> 'Buzz Magenta'	-	T
<i>Buddleja</i> 'Lochinch'	S	-
<i>Caryopteris x clandonensis</i> 'Heavenly Blue'	T	T
<i>Caryopteris x clandonensis</i> 'Worcester Gold'	T	-
<i>Ceanothus</i> 'Blue mound'	-	T
<i>Ceanothus</i> 'Concha'	T	-
<i>Ceanothus x delileanus</i> 'Gloire de Versailles'	T	T

Varieties	Dual Gold (applied summer 2011)	Sumimax (applied winter 2012)
<i>Ceratostigma willmottianum</i> 'Forest Blue'	T	-
<i>Ceratostigma plumbaginoides</i>	T	T
<i>Chaenomeles x superba</i> 'Crimson and Gold'	T	-
<i>Chaenomeles x superba</i> 'Pink Lady'	T	-
<i>Cistus x pulverulentus</i> 'Sunset'	-	T
<i>Clematis alpina</i> 'Constance'	T	-
<i>Clematis x cartmanii hort.</i> 'Avalance'	T	-
<i>Clematis interfolia</i> 'Petit foucon'	T	-
<i>Clematis macropeta</i> 'Markham's Pink'	T	-
<i>Clematis macropetala</i>	T	-
<i>Clematis montana</i> 'Rubens'	T	-
<i>Clematis</i> 'Piilu'	-	T
<i>Clematis</i> 'Polish Spirit'	-	T
<i>Convolvulus cneorum</i>	-	T
<i>Cornus alba</i> 'Baton Rouge'	-	T
<i>Cornus sericea</i> 'Flaviramea'	T	T
<i>Cornus sericea</i> 'Hedgerows Gold' (v)	T	S
<i>Cornus sanguinea</i> 'Midwinter Fire'	T	-
<i>Cornus alba</i> 'Sibirica Variegata'	T	T
<i>Coronilla valentina subsp. glauca</i> 'Citrina'	-	T
<i>Continus coggygria</i> 'Royal Purple'	T	T
<i>Cytisus</i> 'Lena'	T	T
<i>Cytisus</i> 'Porlock'	-	MS
<i>Cytisus x praecox</i>	T	-
<i>Cytisus x praecox</i> 'Allgold'	-	T
<i>Deutzia gracilis</i> 'Nikko'	T	-
<i>Elaeagnus pungens</i> 'Maculata'	T	T
<i>Escallonia</i> 'Peach Blossom'	-	T
<i>Escallonia</i> 'Red Dream'	T	T
<i>Euonymus fortunei</i> 'Emerald Gaiety'	-	MS
<i>Euonymus fortunei</i> 'Emerald'n gold'	-	T
<i>Euonymus japonicas</i> 'Ovatus Albus'	-	T
<i>Euonymus fortunei</i> 'Silver Queen'	-	MS
<i>Euphorbia</i> 'Despina'	-	T
<i>Euryops pectinatus</i>	-	MS
<i>Exochorda x macrantha</i> 'The Bride'	T	T
<i>Forsythia x intermedia</i> 'Lynwood Variety'	T	T
<i>Fuchsia</i> 'Delta's Sarah'	T	-
<i>Genista lydia</i>	T	T
<i>Hebe</i> 'Silver Queen'	T	-
<i>Hebe</i> 'Margaret'	T	-

Varieties	Dual Gold (applied summer 2011)	Sumimax (applied winter 2012)
<i>Hebe</i> 'Sapphire'	MS	-
<i>Hedera colchica</i> 'Dentata Variegata'	T	T
<i>Hedera helix</i> 'Glacier'	T	S
<i>Helichrysum</i> 'icles'	-	T
<i>Helichrysum italicum</i> 'Korma'	T	T
<i>Hydrangea macrophylla</i> 'Madame Emile Mouillere'	T	-
<i>Hydrangea paniculata</i> 'Phantom'	-	T
<i>Hydrangea petiolaris</i>	T	T
<i>Hydrangea aspera</i> Villosa Group	T	-
<i>Hypericum</i> 'Hidcote variegata'	T	T
<i>Hypericum</i> x <i>moserianum</i>	-	T
<i>Hypericum</i> x <i>moserianum</i> 'Tricolor'	-	T
<i>Ilex</i> x <i>altaclerensis</i> 'Golden King'	T	T
<i>Jasminum humile</i> 'Revolution'	T	-
<i>Jasminum nudiflorum</i>	-	T
<i>Jasminum officinale</i> 'Clotted Cream'	S	-
<i>Kerria</i> 'Golden Guinea'	T	MS
<i>Kolkwitzia</i> 'Pink Cloud'	T	T
<i>Lavatera</i> x <i>clementii</i> 'Burgundy Wine'	-	T
<i>Lavatera</i> x <i>clementii</i> 'Rosea'	T	-
<i>Lavendula angustifolia</i> 'Vera'	-	T
<i>Lavendula angustifolia</i> 'Hidcote'	T	-
<i>Lavender stoechas</i> 'Regal Splendour'	T	T
<i>Leycesteria formosa</i> 'Golden Lanterns' = 'Notbruce'	T	S
<i>Ligustrum japonicum</i> 'Aureum'	T	T
<i>Ligustrum ovalifolium</i>	-	MS
<i>Lonicera nitida</i> 'Baggesen's Gold'	T	MS
<i>Lonicera japonica</i> 'Cream Cascade'	-	T
<i>Lonicera fragrantissim</i> '	MS	T
<i>Lonicera japonica</i> 'Halliana'	MS	-
<i>Mahonia</i> x <i>media</i> 'Charity'	-	T
<i>Mahonia</i> x <i>media</i> 'Lionel Fortescue'	T	-
<i>Osmanthus</i> x <i>burkwoodii</i>	T	T
<i>Pachysandra terminalis</i> 'Green Carpet'	-	T
<i>Pachysandra terminalis</i> 'Variegata'	-	T
<i>Pelargonium</i> Angeleyes Bicolor 'Pabicolor'	-	S
<i>Perovskia</i> 'Blue Spire'	T	-
<i>Philadelphus</i> 'Belle Etoile'	-	T
<i>Philadelphus</i> 'Manteau d'Hermine'	T	T
<i>Philadelphus</i> 'Starbright'	-	T
<i>Photinia fraseri</i> 'Red Robin'	T	-



Varieties	Dual Gold (applied summer 2011)	Sumimax (applied winter 2012)
<i>Photinia</i> 'Scarlet Blaze'	-	MS
<i>Physocarpus opulifolius</i> 'Angel Gold'	T	T
<i>Physocarpus opulifolius</i> 'Diabolo'	-	T
<i>Physocarpus opulifolius</i> 'Lady in Red'	T	T
<i>Pittosporum garnettii</i>	-	T
<i>Pittosporum tenuifolium</i> 'Tom Thumb'	-	S
<i>Potentilla fruticosa</i> 'Abbotswood'	T	-
<i>Potentilla fruticosa</i> 'Gold Star'	T	-
<i>Prunus incisa</i> 'Kojo-no-Mai'	T	T
<i>Prunus laurocerasus</i> 'Cherry Brandy'	T	T
<i>Pyracantha</i> 'Mohave'	-	S
<i>Pyracantha</i> 'Orange Glow'	T	-
<i>Pyracantha coccinea</i> 'Red Column'	T	S
<i>Rhus typhina</i> 'Laciniata'	S	-
<i>Rosa</i> 'Iceberg' = 'Korbin'	T	T
<i>Rosmarinus</i> 'Miss Jessopp's Upright'	T	-
<i>Sambucus nigra</i> f. <i>porphyrophylla</i> 'Eva'	S	T
<i>Santolina chamaecyparissus</i>	-	T
<i>Santolina rosmarinifolia</i> 'Primrose Gem'	-	T
<i>Brachyglottis</i> (Dunedin Group) 'Drysdale'	-	T
<i>Sorbaria sorbifolia</i> 'Sem'	T	T
<i>Spiraea</i> 'Arguta'	T	T
<i>Spiraea japonica</i> 'Firelight'	T	T
<i>Spiraea japonica</i> 'Golden Princess'	-	T
<i>Spiraea japonica</i> 'Goldflame'	T	T
<i>Spiraea japonica</i> 'Little Princess'	-	MS
<i>Spiraea japonica</i> 'Shirobana'	T	T
<i>Syringa x josiflexa</i> 'Bellicent'	T	T
<i>Syringa meyeri</i> 'Palibin'	-	T
<i>Viburnum davidii</i>	T	S
<i>Vinca major</i> 'Maculata'	T	-
<i>Vinca minor</i> 'Ralph Shugert'	T	-
<i>Weigela</i> 'Kosteriana variegata'	T	T
<i>Weigela florida</i> 'Foliis Purpureis'	T	T
<i>Wisteria floribunda</i> 'Domino' = 'Issai'	T	-

## Financial Benefits

The use of Dual Gold should give improved summer weed control particularly for willowherb, groundsel and grasses although the rate of use approved is lower than that used in trials so

efficacy could be reduced. Sumimax is a possible replacement for Butisan S or Sultan 50 SC as a winter clean-up and residual treatment for weed control in established stock.

Virtually all container nursery stock growers could benefit from this work as weed control is a common problem across the industry. Willowherb and groundsel are particular problems and restrictions on the use of metazachlor containing products such as Butisan S or Sultan 50 SC imposed this year will make control more difficult to achieve. The costs of Dual Gold and Sumimax are relatively low at £14/ha and £17/ha respectively. It is anticipated that saving one round of hand weeding at a cost of 2.5p per pot (187,500 pots/ha) equates to a saving of £4687/ha

### **Action Points**

- Dual Gold can be used as an addition to the normal herbicide programme on a wide range of HNS subjects for improved control of groundsel, grasses and willowherb
- Dual Gold is only authorised for application during May at 0.78 L/ha under EAMU 20120501
- Sumimax (or similar products Guillotine and Digital) can be used on a range of HNS subjects (see list of susceptibility in Table 1) during the dormant season for control of existing seedling weeds and residual weed control
- Sumimax, Digital and Guillotine are authorised for use on outdoor ornamentals under EAMUs 20082844, 20082897 and 20082881
- Although a number of dormant evergreen species were tolerant of Sumimax it caused damage to some species such as *Pyracantha*. Some caution should therefore be exercised before treating species for the first time.