AP97002
Development of crop regulation strategies for new and problem apple cultivars - Gala

Sally Bound
Tasmanian Institute for Agricultural Research

HAL

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The research contained in this report was funded by the Horticultural Research and Development Corporation with the financial support of the apple levy.

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Cover price: $20.00
NSW Agriculture ISBN 1 86423 888 7
Reprinted and distributed by:
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Project AP97002

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FINAL REPORT

Project supervisor: Sally Bound

Project commenced: 1/9/97
Project completed: 31/12/98

Tasmanian Institute of Agricultural Research

HORTICULTURAL RESEARCH & DEVELOPMENT CORPORATION
The Research Arm of the Australian Horticultural Industries
Final Report: AP97002

HORTICULTURAL RESEARCH AND DEVELOPMENT CORPORATION

FINAL REPORT

Project title: Development of crop regulation strategies for new and problem apple cultivars - Gala

HRDC Reference No: AP97002

Organisation: Tasmanian Institute of Agricultural Research
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Locations of research: Lucaston, Grove, New Town

Duration of project:
Project commenced: 01/09/97
Project completed: 31/12/98

Funding:

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Acknowledgments

This work was funded by the Horticultural Research and Development Corporation. The desiccants FPX0259 (trade name Culminate) and KHance were provided by Ferro Corporation (Aust) Pty Ltd.

The assistance of Mr Tom Frankcomb is gratefully acknowledged for making available trees for the trial work.

Technical support was provided by Mr Shenan Daniels and Ms Caron Summers.
Technical Summary

Introduction

Without the use of chemical thinning agents, many apple cultivars become biennial bearers. Many of the chemicals currently being used as thinning agents are under scrutiny on environmental grounds. Both the current blossom thinners used in Australia are unpredictable, being dependent on ambient conditions, particularly temperature, both at time of application and following application.

Although many new cultivars, such as 'Gala', 'Jonagold', 'Pink Lady', 'Sundowner' and 'Braeburn' have been planted in quantity in Australia there are no chemical thinning recommendations available. Thinning strategies cannot be transposed from one cultivar to another. Following recommendations developed for other cultivars is likely to lead to either under or over thinning or other complications such as russetting of fruit or pygmy fruit production. The lack of information available on these cultivars prevents the development of reliable thinning recommendations, which in turn restricts planting and development of these cultivars. Thinning and fruit size manipulation is critical in successfully introducing a new cultivar.

Consultation with many Australian growers and consultants has established that there is an urgent need to find thinning solutions for the new cultivars which are now being extensively planted.

The advantages of a reliable chemical thinning program are:
- regular cropping without the problem of biennial bearing
- increased fruit size
- improved fruit colour and quality
- reduced hand thinning costs
- fewer limb breakages
- earlier thinning increases cell numbers resulting in increased fruit firmness
- the chance to establish a calendar of events and priorities which fully utilise windows of opportunity
- reduced chemical usage
- options will allow growers producing new cultivars the flexibility to address demands of several markets

The aim of this work was to undertake a preliminary assessment of the desiccants FPX0259 (trade name Culminate), a formulation of ammonium thiosulphate and KHance, a formulation of potassium thiosulphate (Ferro Corporation (Aust) Pty Ltd) on the cultivar 'Gala' to determine whether this desiccant could have potential as a blossom thinner of this cultivar.

Summary

All spray treatments had a thinning effect, reducing both crop load variables, number of fruit per cm² TCSA and number of fruit per 100 blossom clusters, compared to the control. The thinning effect was increased with increasing concentration of Culminate. This pattern was also seen in the KHance treatments. Increasing the number of applications of Culminate from one to three also increased the thinning effect. Both fruit weight and size were also improved by some treatments.

There was no excessive leaf damage in any of the treatments in this trial.
While this work suggests that both Culminate and KHance have potential as thinning agents for the cultivar 'Gala' the scope of the trial work presented here does not enable development of full recommendations for thinning 'Gala'. As more than one year is required to properly examine the effects of a chemical on an apple cultivar and to develop a full program of thinning recommendations it is suggested that this work will need to be continued.

It should also be noted that in the trial described here all chemicals have been applied at high volume. If low volume CDA technology is used for application of desiccants then the recommendation for concentration is likely to alter. This is due to the reduction in wastage and greater efficiency of CDA low volume technology.

There is also the need to examine the effects of temperature on thinning activity. The effect of rewetting of trees shortly after spray application should also be determined. Further work should encompass various cultivar responses, temperature effects and dosage response using CDA.

Further work will be required to determine both the optimal concentration and timing of both Culminate and KHance for 'Gala'. Additional trials will also be required to establish the feasibility of incorporating post-bloom thinners into a program with desiccating chemicals. Hence it is recommended that a further 2-3 years will be necessary before thinning recommendations can be developed for this cultivar.
Industry Summary

Introduction

Although many new cultivars, such as ‘Gala’, ‘Jonagold’, ‘Pink Lady’, ‘Sundowner’ and ‘Braeburn’ have been planted in quantity in Australia there are no chemical thinning recommendations available. Thinning strategies cannot be transposed from one cultivar to another. Following recommendations developed for other cultivars is likely to lead to either under or over thinning or other complications such as russetting of fruit or pygmy fruit production. The lack of information available on these cultivars prevents the development of reliable thinning recommendations, which in turn restricts planting and development of these cultivars. Thinning and fruit size manipulation is critical in successfully introducing a new cultivar.

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This work suggests that both Culminate and KHance are potential thinning agents for the cultivar ‘Gala’. However the scope of the trial work presented here does not enable development of full recommendations for thinning ‘Gala’. These results are preliminary only and it would be premature to use these results to develop recommendations for a thinning program using blossom desiccants on ‘Gala’. As more than one year is required to properly examine the effects of a chemical on an apple cultivar and to develop a full program of thinning recommendations it is suggested that this work will need to be continued.

It should also be noted that in the trial described here all chemicals have been applied at high volume. If low volume CDA technology is used for application of desiccants then the recommendation for concentration is likely to alter. This is due to the reduction in wastage and greater efficiency of CDA low volume technology.

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Further work will be required to determine both the optimal concentration and timing of both Culminate and KHance for ‘Gala’. Additional trials will also be required to established to assess the feasibility of incorporating post-bloom thinners into a program with desiccating chemicals. Hence it is recommended that a further 2-3 years will be necessary before thinning recommendations can be developed for this cultivar.
Introduction

Thinning strategies cannot be transposed from one cultivar to another. Ebert and Bangerth (1981) showed that cultivars such as 'Fuji' and 'Gala' vary widely in their response to thinning chemicals. Jones et al (1989, 1990, 1992) found that red 'Fuji' did not respond to thinners in the same way as older, established cultivars such as 'Golden Delicious' or red 'Delicious'. Following recommendations developed for other cultivars is likely to lead to either under or over thinning or other complications such as russetting of fruit or pygmy fruit production. The lack of information available on these cultivars prevents the development of reliable thinning recommendations, which in turn restricts planting and development of these cultivars. Thinning and fruit size manipulation is critical in successfully introducing a new cultivar.

Although many new cultivars, such as 'Gala', 'Jonagold', 'Pink Lady', 'Sundowner' and 'Braeburn' have been planted in quantity in Australia there are no chemical thinning recommendations available. Stebbins (1989) and Tvergyak (1993) have pointed out that in the USA strategies for thinning new cultivars were not available and recommendations not possible. The search for reliable, effective chemical thinning programmes for the cultivars 'Gala', 'Braeburn' and 'Fuji' is still in a developmental stage (Honeyborne, 1996).

Jones (1996) suggests that sequential spray strategies are more predictable than single blossom sprays of high concentration. Both NAA and ethephon can depress fruit size if used at high concentrations or if applied too late (Jones et al, 1983, 1989, 1992, 1993).

Many of the chemicals currently being used as thinning agents are under scrutiny on environmental grounds. Martin et al (1990) have referred to the possible loss of NAA as a thinner in the USA. Carbaryl is a persistent pesticide which is also toxic to bees and other invertebrates and is being found in ground water (Jones, personal. comm.). Jones (1994) has referred to the problems of the continued use of carbaryl in the New Zealand fruit industry and the need to find alternatives. Although the Australian Apple and Pear Growers Association Charter (Anon, 1990) refers to the total reduction of chemicals used, the organisation is also aware of the need to move away from dangerous chemicals.

The use of desiccating chemicals for thinning is receiving more attention (Warner, 1996). These chemicals act by burning the style and stigma, thus preventing fertilisation. Desiccants do not thin pollinated blossom where fruit set has been achieved prior to spray application. These substances also break down to simple naturally occurring compounds soon after application. Ammonium thiosulphate (ATS) has reduced fruit set in peaches and plums (Byers and Lyons, 1984, 1985; Byers et al, 1985; Webster and Hollands, 1993). Byers et al (1986) found treatment of the stigma, petals + anthers, peduncle, or calyx with ATS reduced fruit set in several varieties of peach. Byers et al (1990) reduced crop load and increased both fruit volume and return bloom. Byers and Lyons (1984) achieved thinning and increased fruit size of peach with airblast application of ATS. Irving et al (1989) demonstrated that ATS could thin apple when applied directly to the stamens and styles. Williams et al (1995) and Bound and Jones (1997) have demonstrated the potential of endothal, also a blossom desiccant, as an early blossom thinner.

Consultation with many Australian growers and consultants has established that there is an urgent need to find thinning solutions for the new cultivars which are now being extensively planted.

The advantages of a reliable chemical thinning program are:
- regular cropping without the problem of biennial bearing
- increased fruit size
- improved fruit colour and quality
- reduced hand thinning costs
- fewer limb breakages
- earlier thinning increases cell numbers resulting in increased fruit firmness
- the chance to establish a calendar of events and priorities which fully utilise windows of opportunity
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- options will allow growers producing new cultivars the flexibility to address demands of several markets

The aim of this work was to undertake a preliminary assessment of the desiccants FPX0259 (trade name Culminate), a formulation of ammonium thiosulphate and KHance, a formulation of potassium thiosulphate (Ferro Corporation (Aust) Pty Ltd) on the cultivar ‘Gala’ to determine whether this desiccant could have potential as a blossom thinner of this cultivar.

Achievement of objectives

The work program, as defined in the funding application for this project has been successfully completed and project objectives have been achieved.

Methods

Trial establishment

Trials were conducted at Lucaston in the Huon Valley, southern Tasmania over the 1997/98 season. Seven year old ‘Gala’ trees on MM106 rootstock were selected in September 1997. Planting spacing was 5 m between rows and 2 m within the row. Trees were approximately 2.5 m in height.

Trunk girths were measured four centimetres above the graft union and trunk cross-sectional areas (TCSA) calculated. Blossom clusters were counted in October and blossom density (number of blossom clusters per cm$^2$ TCSA) calculated. Trees were blocked into five blossom density groups and treatments allocated at random to single tree plots within each block, giving five replicates per treatment.

Treatment application

Table 1: Treatments applied to Gala

<table>
<thead>
<tr>
<th>Treatment Description</th>
<th>Concentration/Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (untreated)</td>
<td></td>
</tr>
<tr>
<td>0.5% Culminate @ 80% bloom</td>
<td></td>
</tr>
<tr>
<td>1.0% Culminate @ 80% bloom</td>
<td></td>
</tr>
<tr>
<td>1.5% Culminate @ 80% bloom</td>
<td></td>
</tr>
<tr>
<td>0.5% Culminate @ 30% &amp; 80% bloom</td>
<td></td>
</tr>
<tr>
<td>1.0% Culminate @ 30% &amp; 80% bloom</td>
<td></td>
</tr>
</tbody>
</table>
1.5% Culminate @ 30% & 80% bloom
0.5% Culminate @ 30% & 80% bloom & 5 dAFB
1.0% Culminate @ 30% & 80% bloom & 5 dAFB
1.5% Culminate @ 30% & 80% bloom & 5 dAFB
0.5% KHance @ 30% & 80% bloom
1.0% KHance @ 30% & 80% bloom
1.5% KHance @ 30% & 80% bloom

An unsprayed control treatment was included. All sprays were applied with a hand lance at a spray volume of 2,500 l/ha. The wetter Tween 20 (polyoxyethylene sorbitan monolaurate) was included at the rate of 1250 mg l⁻¹ with all applications.

Fruit was harvested in March 1998. Total numbers of fruit per tree were counted and weighed. Two crop load variables, number of fruit/100 blossom clusters and number of fruit/cm² TCSA, were calculated. Mean fruit weight was also determined.

Fruit was graded on a size grader into 5 mm diameter categories and the number of fruit ≥ 70 mm diameter determined.

Data analysis

Data was analysed by analysis of variance using the Genstat 5 statistical package. A significance level of p = 0.05 was used when comparing treatment means.

Results

All treatments reduced the number of fruit per cm² TCSA compared to the control (Figure 1, Table 2). Increasing concentration of Culminate resulted in a greater thinning effect. This pattern was also seen in the KHance treatments. Increasing the number of applications of Culminate from one to three also increased the thinning effect.

While the second crop load variable, number of fruit per 100 blossom clusters, followed a similar pattern to the number of fruit per cm² TCSA (Figure 2, Table 2) not all treatments decreased crop load compared with the control. Those treatments that failed to reduce crop load were the single and double Culminate treatments at the lower rate of 0.5%.

Mean fruit weight (Figure 3, Table 3) was increased compared to the control by both 1.0 and 1.5% single Culminate applications, 1.5% double application and the 1.0% triple application. Both the 1.0 and 1.5% KHance treatments improved fruit weight.

Fruit size, expressed as percentage fruit greater than or equal to 70 mm diameter, followed a similar pattern to mean fruit weight (Figure 4, Table 3).

There was no excessive leaf damage in any of the treatments in this trial (results not presented).
Figure 1: The effect of the desiccants Culminate and KHance on the crop load variable, number of fruit per cm² TCSA of 'Gala' apple. (C x1 = Culminate at 80% bloom; C x2 = Culminate at 30 & 80% bloom; C x3 = Culminate at 30 & 80% bloom and 5 dAFB; K x2 = KHance at 30 & 80% bloom)

Figure 2: The effect of the desiccants Culminate and KHance on the crop load variable, number of fruit per 100 blossom clusters on 'Gala' apple. (C x1 = Culminate at 80% bloom; C x2 = Culminate at 30 & 80% bloom; C x3 = Culminate at 30 & 80% bloom and 5 dAFB; K x2 = KHance at 30 & 80% bloom)
Table 2: The effect of the desiccants FPX and KHance on crop load (number of fruit per cm² TCSA and number of fruit per 100 blossom clusters) of Gala

<table>
<thead>
<tr>
<th></th>
<th>Fruit per cm² TCSA</th>
<th>Fruit per 100 blossom clusters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>11.6 a</td>
<td>188.5 a</td>
</tr>
<tr>
<td>0.5% Culminate @ 80% bloom</td>
<td>9.0 bc</td>
<td>145.0 ab</td>
</tr>
<tr>
<td>1.0% Culminate @ 80% bloom</td>
<td>5.2 efg</td>
<td>89.8 cd</td>
</tr>
<tr>
<td>1.5% Culminate @ 80% bloom</td>
<td>5.0 efg</td>
<td>90.5 cd</td>
</tr>
<tr>
<td>0.5% Culminate @ 30% &amp; 80% bloom</td>
<td>8.5 bcd</td>
<td>144.8 ab</td>
</tr>
<tr>
<td>1.0% Culminate @ 30% &amp; 80% bloom</td>
<td>5.9 efg</td>
<td>103.5 bcd</td>
</tr>
<tr>
<td>1.5% Culminate @ 30% &amp; 80% bloom</td>
<td>3.5 gh</td>
<td>59.7 de</td>
</tr>
<tr>
<td>0.5% Culminate @ 30 &amp; 80% bloom &amp; 5 dAFB</td>
<td>6.5 cdef</td>
<td>109.2 bcd</td>
</tr>
<tr>
<td>1.0% Culminate @ 30 &amp; 80% bloom &amp; 5 dAFB</td>
<td>4.3 fg</td>
<td>69.1 cde</td>
</tr>
<tr>
<td>1.5% Culminate @ 30 &amp; 80% bloom &amp; 5 dAFB</td>
<td>1.5 h</td>
<td>26.1 e</td>
</tr>
<tr>
<td>0.5% Khance @ 30% &amp; 80% bloom</td>
<td>7.4 bcde</td>
<td>117.7 bc</td>
</tr>
<tr>
<td>1.0% Khance @ 30% &amp; 80% bloom</td>
<td>6.4 def</td>
<td>91.8 cd</td>
</tr>
<tr>
<td>1.5% Khance @ 30% &amp; 80% bloom</td>
<td>4.3 fg</td>
<td>71.5 cde</td>
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</table>

\( lsd (p=0.05) \) 2.5 50.7

\( jprob (p=0.05) \) <0.001 <0.001

Figure 3: The effect of the desiccants Culminate and KHance on mean fruit weight of ‘Gala’ apple. (C x1 = Culminate at 80% bloom; C x2 = Culminate at 30 & 80% bloom; C x3 = Culminate at 30 & 80% bloom and 5 dAFB; K x2 = KHance at 30 & 80% bloom)
Table 3: The effect of the desiccants Culminate and KHance on fruit weight and size of Gala

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Mean fruit weight (g)</th>
<th>% fruit ≥ 70mm diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>128.9 abc</td>
<td>40.7 abcd</td>
</tr>
<tr>
<td>0.5% Culminate @ 80% bloom</td>
<td>125.5 ab</td>
<td>33.0 ab</td>
</tr>
<tr>
<td>1.0% Culminate @ 80% bloom</td>
<td>145.9 def</td>
<td>62.5 de</td>
</tr>
<tr>
<td>1.5% Culminate @ 80% bloom</td>
<td>141.0 cde</td>
<td>54.4 bcd</td>
</tr>
<tr>
<td>0.5% Culminate @ 30% &amp; 80% bloom</td>
<td>130.5 abc</td>
<td>37.6 abc</td>
</tr>
<tr>
<td>1.0% Culminate @ 30% &amp; 80% bloom</td>
<td>134.6 abcd</td>
<td>45.2 abcd</td>
</tr>
<tr>
<td>1.5% Culminate @ 30% &amp; 80% bloom</td>
<td>142.1 cde</td>
<td>52.4 bcd</td>
</tr>
<tr>
<td>0.5% Culminate @ 30 &amp; 80% bloom &amp; 5 dAFB</td>
<td>134.8 abcd</td>
<td>45.5 abcd</td>
</tr>
<tr>
<td>1.0% Culminate @ 30 &amp; 80% bloom &amp; 5 dAFB</td>
<td>158.2 f</td>
<td>79.1 e</td>
</tr>
<tr>
<td>1.5% Culminate @ 30 &amp; 80% bloom &amp; 5 dAFB</td>
<td>137.5 abcde</td>
<td>50.4 bcd</td>
</tr>
<tr>
<td>0.5% Khance @ 30% &amp; 80% bloom</td>
<td>135.0 abcde</td>
<td>46.1 abcd</td>
</tr>
<tr>
<td>1.0% Khance @ 30% &amp; 80% bloom</td>
<td>138.9 bcde</td>
<td>55.2 cd</td>
</tr>
<tr>
<td>1.5% Khance @ 30% &amp; 80% bloom</td>
<td>151.8 cf</td>
<td>60.7 de</td>
</tr>
</tbody>
</table>

l<sub>sd</sub> (p<0.05) 14.5 22.2

f<sub>prob</sub> (p<0.05) <0.001 0.002

Figure 4: The effect of the desiccants Culminate and KHance on fruit size of 'Gala' apple.
(C x1 = Culminate at 80% bloom; C x2 = Culminate at 30 & 80% bloom; C x3 = Culminate at 30 & 80% bloom and 5 dAFB; K x2 = KHance at 30 & 80% bloom)
Discussion

Thinning fruit and the subsequent effects on fruit size, fruit quality and regular cropping is dependent on having a predictable thinning program. Failure to develop a reliable thinning program for each new cultivar can lead to unpredictable results of either under thinning, resulting in large hand thinning costs and reducing grower returns, or of overthinning, leading to poor returns to the grower. There is also a danger of promoting a biennial bearing pattern where alternate year crops are lost. If development of reliable thinning programs is delayed valuable years of cropping are lost.

Both concentration and time of application of chemical are critical issues in determining the effectiveness of blossom desiccants as thinning agents. The concentration of the desiccant needs to be sufficiently high to inactivate the style/stigma without damaging the receptacle which forms the fruit, or causing excessive damage to leaves and buds. Working with Culminate on red ‘Delicious’, Bound (1995) showed that concentrations as low as 0.3% were ineffective, while rates as high as 3.0% caused excessive phytotoxicity. The levels used in the work reported here on ‘Gala’ (0.5 - 1.5%) achieved sufficient damage to the reproductive organs to prevent fruit set without causing unacceptable phytotoxicity.

To achieve target crop loads the chemical must be applied when sufficient flowers have been fertilised and set fruit. The later application is left the higher the fruit set. Conversely if application is too early then the later opening flowers, particularly in cultivars such as ‘Gala’, which flower over an extended period, will be unaffected and are still likely to set.

Although Bound (1998) demonstrated the importance of early application to ensure set is not too high in red ‘Delicious’ results were not so clear cut in this work on ‘Gala’ where thinning results achieved with one application were very similar to those with two applications. This apparent lack of response with two applications on ‘Gala’ may be due to weather conditions during the early blossom period resulting in low fruit set of the earlier opening flowers.

Bound (1998) suggested that multiple applications may be the most effective way of lowering the concentration of the chemical applied at any one time. She reported that on red ‘Delicious’ two applications of 0.8% Culminate achieved the same thinning levels as one application of 1.4% Culminate. Similarly, three applications at the lower rate achieved the same results as two applications at the higher rate. Hence it is possible to work out a balance between concentration and number of applications in order to minimise potential damage. In the cultivar ‘Gala’ which has an extended flowering period compared to red ‘delicious’, three applications were very effective, particularly at the higher concentration of 1.5% where overthinning occurred.

Although three applications of the higher rate of Culminate overthinned, fruit size was statistically no better than that of the untreated control. It may be that 3 applications at this higher rate had a detrimental effect on either the tree or on fruit growth.

The thinning effect seen in the KHance treatments demonstrates that this chemical also has potential as a blossom thinner. Being acceptable to the organic market this product needs to be followed up and examined more closely to refine both application rates and timing. It also needs to be assessed in a program with post-bloom thinners to ensure that there are no negative interactions. The effect on KHance on fruit quality and fruit storage life also needs to be explored.
Conclusions

This work suggests that both Culminate and KHance are potential thinning agents for the cultivar 'Gala'. However the scope of the trial work presented here does not enable development of full recommendations for thinning 'Gala'. These results are preliminary only and it would be premature to use these results to develop recommendations for a thinning program using blossom desiccants on 'Gala'. As more than one year is required to properly examine the effects of a chemical on an apple cultivar and to develop a full program of thinning recommendations it is suggested that this work will need to be continued.

It should also be noted that in the trial described here all chemicals have been applied at high volume. If low volume CDA technology is used for application of desiccants then the recommendation for concentration is likely to alter. This is due to the reduction in wastage and greater efficiency of CDA low volume technology.

Further work will be required to determine both the optimal concentration and timing of both Culminate and KHance for 'Gala'. Additional trials will also be required to established to assess the feasibility of incorporating post-bloom thinners into a program with desiccating chemicals. Hence it is recommended that a further 2-3 years will be necessary before thinning recommendations can be developed for this cultivar.

Extension / adoption by industry

During the course of this project the results have been discussed with grower groups and consultants around Australia. A number of articles discussing the development and use of desiccants have been published in Pome Fruit Australia.

A number of growers have trialed Culminate using commercial spray equipment and achieved good results. Ferro Corporation have submitted an application to the National Registration Authority for registration of Culminate under the trade name Culminate as a blossom thinner of red 'Delicious' apples.

The results from this trial have been used to develop trial protocols for continuing work on desiccants as blossom thinners of 'Gala' in the HRDC funded project AP98011 - National Crop Regulation program which commenced in September 1998.

Once thinning programs have been developed following further trial work the results will be encoded into the Apple Thinning Program - a computerised expert system currently being developed by the Tasmanian Department of Primary Industry & Fisheries and the Tasmanian Institute of Agricultural Research. This program will be made available to growers throughout Australia.

Industry implications and recommendations for future work

This work was undertaken on one cultivar, 'Gala, and results cannot be transferred to other cultivars without further scientific justification. As cultivars respond differently to thinning chemicals, thinning recommendations cannot be transferred from one cultivar to another.
There is also the need to examine the effects of temperature on thinning activity. The effect of rewetting of trees shortly after spray application should also be determined.

It should be noted that in the trial described here all chemical applications have been done at high volume. If low volume CDA technology is used for application of desiccants then the recommendation for concentration is likely to alter. This is due to the reduction in wastage and greater efficiency of CDA low volume technology.

Further work should encompass various cultivar responses, temperature effects and dosage response using CDA.

The preliminary work with KHance demonstrates that it also has potential as a blossom thinner. Being acceptable to the organic market this product needs to be followed up and examined at lower concentrations, multiple applications and in conjunction with post-bloom thinners. The effect on KHance on fruit quality and fruit storage life also needs to be explored.

All desiccants need to be assessed in a program with the post-bloom thinner CyLex™ (Abbott Laboratories) and the plant growth regulator Cytolin® (Abbott Laboratories) which is commonly used to improve fruit shape and size to ensure that there are no adverse reactions.
References


