

# **Grower Summary**

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## **HNS 187**

Evaluating the potential of  
plant growth regulators to  
limit growth on tree and  
hedging species

Annual 2014

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**Project Number:** HNS 187

**Project Title:** Evaluating the potential of plant growth regulators to limit growth on tree and hedging species

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**Report:** Annual, April 2014

**Publication Date:** 25/07/2014

**Previous report/(s):** None

**Start Date:** 1 March 2013

**End Date:** 31 March 2015

**HDC Cost (Total cost):** £23,500.00

### **Further information**

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# **GROWER SUMMARY**

## **Headline**

- Chlormequat had an growth regulatory effect on all the plant species examined in the trial, the other chemical growth regulator treatments were more variable in their effect.

## **Background**

Various species of tree and hedging plants grown from seed, lifted, graded and re-planted as one year old transplants can be too vigorous, resulting in plants that exceed customer's height specifications. Cutting raised subjects frequently get too tall in the first year of growth. In some cases, crops such as *Salix* are topped before lifting, however this is not an option where species such as *Populus* are destined to be sold as trees. In addition to the fact that there is no real demand for transplants over 90cm, tall crops can be more difficult and costly to lift, handle and store.

Although undercutting is used to slow growth during the growing season by many growers, the practice is not effective unless soils are dry. This research project aims to evaluate the use of selected chemical plant growth regulators to determine if they reduce the growth of five vigorous plant species: *Alnus glutinosa*, *Betula pendula*, *Populus x canadensis* 'Robusta', *Prunus avium* and *Sorbus aucuparia*.

The overarching aim of the work was to evaluate the effectiveness of Fargo Chlormequat (chlormequat) which has on-label uses for ornamentals, P003 which was used as an experimental product on field-grown ornamentals and Regalis (prohexadione calcium) used under Extension of Authorisation for Minor Use (EAMU 2866/08) as growth regulators on the aforementioned species. P003 was applied as both a foliar spray and via a 'weed wiper'. The weed wiper was used to selectively treat the taller plants within a bed. An untreated control was included in the experimental design for comparison. Growers should note that P003 cannot be used on field grown crops unless the product label changes or an Extension of Authorisation for Minor Use (EAMU) is issued.

Undercutting during the growing season is the current method of regulating growth in field-grown tree and hedging production, however this method is not very effective as plants have to be watered in dry weather to prevent losses. Undercutting does not provide enough of a stress response when soils are moist as the remaining root system is still capable of absorbing sufficient levels of water. A planned number of carefully timed applications of a chemical growth regulator has the potential to limit the growth of vigorous species. Growth

regulators can be applied throughout the growing season permitting more precise control of crop growth even in wet summers.

## Summary

All products were used at the maximum label/EAMU rate as it was felt that this would be necessary in order to achieve the desired growth control of the species tested. Fargo Chlormequat proved to be the most effective growth regulator on *Alnus*, *Betula*, *Populus* and *Sorbus*, however the product caused excessive stunting on *Sorbus*. Unfortunately chlormequat also caused phytotoxicity (as transitory leaf yellowing) on all the species tested. Although the affected leaves will have been shed by the time treated crops are dispatched to customers the leaf yellowing still presents a quality issue for growers. This is because customers often visit nurseries during the growing season to place orders and view crops that they have already purchased. The industry representatives and the host grower considered the level of leaf yellowing seen would deter customer purchases of crops treated with high rates of chlormequat. This problem will be addressed in year two by reducing the rates of chlormequat to minimise crop damage, whilst still providing useful growth regulation.

*Prunus* responded best to the foliar sprays of P003; the three foliar sprays of P003 appeared to have a cumulative effect as the reduction in height compared with the untreated controls, this was not clearly detectable until the end of the growing season. P003 applied as a foliar spray also had a beneficial effect on *Sorbus*. Regalis was the second best treatment on *Prunus* and the third best treatment on *Sorbus*. Regalis has label uses on *Malus* (apples) for growth control in orchards, *Malus* are a member of the Rosaceae family as are *Prunus* and *Sorbus*, and therefore it seems that Regalis works on this plant family.

The application of the growth regulator P003 via a weed wiper did not prove to be particularly effective. Although this method of plant growth regulator application resulted in slight reductions in mean heights on *Populus* and *Sorbus* compared with untreated controls, the differences were not statistically significant compared with the untreated control. Other species (*Alnus*, *Betula* and *Prunus*), were taller than untreated controls at the final assessment. It is thought that the weed wiper did not apply sufficient volume of liquid to some species to have an effect. The weed wiper also had to be manually folded up by the operator between uses as the weed wiper did not pick up sufficiently high on the tractor's three point linkage.

Experiments were carried out in commercial beds of crops at Wyevale Transplants, Herefordshire. The soil type was loamy sand with overhead irrigation applied via overhead booms or rain guns, the decision when to irrigate was crop based linked to the weather forecast.

All of the plant growth regulators used within this trial have potential to regulate the growth of at least one species. It is highly likely that plant growth regulators will become a useful tool for growers of field-grown stock to regulate the growth of vigorous species / cultivars in the future. This will enable growers to control crop growth, this technique is widely used by growers of container-grown stock within the ornamentals sector.

All species within the trial responded to at least one plant growth regulator; Fargo Chloromequat resulted in the greatest mean reduction in height during the growing season on *Alnus*, *Betula*, *Populus* and *Sorbus*. P003 (applied as a foliar spray) resulted in the greatest mean reduction on *Prunus*. Not all plant species responded to the chemical growth regulators in the same way. Therefore there is a need to refine treatments in year two of these trials in an attempt to get the best results and create a basic blueprint.

It is worth noting that plant growth regulators should be applied late in the day on a still evening to allow sufficient time for the active to be absorbed. For optimum results plant growth regulators should be applied to a well-watered crop with a dry canopy. Crops should not be overhead irrigated until sufficient time has elapsed post treatment, it is best not to irrigate for 24 hours after treatment. Rainfall or irrigation that occurs before chemical plant growth regulators have been taken up by treated foliage may result in the product being washed off the foliage and taken up by the roots, which generally results in a stronger effect. This is likely to result in excessive growth regulation which may produce excessively stunted crops.

## **Financial Benefits**

Only certain crops such as *Salix* can be mechanically topped, which costs approximately £150/ha. Species grown as trees, where plant habit is important, cannot be topped as this would remove the leader and would have a detrimental effect on the subsequent growth following planting out.

The forestry sector is one of the key market outlets for two year old field-grown tree species, however it is difficult to sell plants over 90 centimetres (cm) in height to this sector. The landscape sector tends to specify that one and two year old tree and hedging plants should be 80-100 cm in height. Plants over 100 cm can normally be substituted for 80-100 cm crops to landscapers providing that they are sold at the same price. Although this is a way of marketing some taller plants, there is not really a market for crops over 90 cm, extra height variation within crops complicates and adds cost to the grading process which can add 5% to costs which typically equates to an additional labour cost of £105 per hectare.

Despite growers using cultural techniques to limit growth in the second year of production, approximately 50% of various species can reach over 100 cm in height in their second year of field production. The following species / cultivars are examples: *Alnus incana*, *Alnus glutinosa*, *Betula pendula*, *Populus x canadensis* 'Robusta', *Prunus avium*, *Sorbus aucuparia* and *Tillia platyphyllos*. Plants of three of the species from untreated plots within the trial exceeded 90 cm (82% of *Betula pendula*, 42% of *Populus x canadensis* 'Robusta' and 20% of *Sorbus aucuparia*).

Although crop spacings vary on individual nurseries, on a typical bed based system there would typically be approximately 300,000 plants per hectare. The average price per plant is typically £0.30, therefore in the worst case scenario up to half of the aforementioned species may be unmarketable in some years which equates to a potential loss of up to £45,000 per hectare.

## Action Points

- Plan to trial the use of chemical plant growth regulators on vigorous species or cultivars to determine the appropriate dose rates and application frequencies required.
- Allow sufficient time for plant growth regulators to be absorbed by plants prior to the application of irrigation, take account of the weather and irrigation schedules before application.
- Be aware that some fungicides e.g. triazole fungicides such as Folicur, Nativo 75WG and Topas can have a growth regulatory effect on plants which needs to be taken account of, particularly if used in conjunction with plant growth regulators.