



# Grower Summary

---

**FV 387b**

**Leeks: Improving quality and  
extending the season in late  
crops in the UK**

**Final 2015**

## **Disclaimer**

While the Agriculture and Horticulture Development Board seeks to ensure that the information contained within this document is accurate at the time of printing, no warranty is given in respect thereof and, to the maximum extent permitted by law the Agriculture and Horticulture Development Board accepts no liability for loss, damage or injury howsoever caused (including that caused by negligence) or suffered directly or indirectly in relation to information and opinions contained in or omitted from this document.

©Agriculture and Horticulture Development Board 2015. No part of this publication may be reproduced in any material form (including by photocopy or storage in any medium by electronic mean) or any copy or adaptation stored, published or distributed (by physical, electronic or other means) without prior permission in writing of the Agriculture and Horticulture Development Board, other than by reproduction in an unmodified form for the sole purpose of use as an information resource when the Agriculture and Horticulture Development Board or AHDB Horticulture is clearly acknowledged as the source, or in accordance with the provisions of the Copyright, Designs and Patents Act 1988. All rights reserved.

The results and conclusions in this report may be based on an investigation conducted over one year. Therefore, care must be taken with the interpretation of the results.

## **Use of pesticides**

Only officially approved pesticides may be used in the UK. Approvals are normally granted only in relation to individual products and for specified uses. It is an offence to use non-approved products or to use approved products in a manner that does not comply with the statutory conditions of use, except where the crop or situation is the subject of an off-label extension of use.

Before using all pesticides check the approval status and conditions of use.

Read the label before use: use pesticides safely.

## **Further information**

If you would like a copy of the full report, please email the AHDB Horticulture office (hort.info.@ahdb.org.uk), quoting your AHDB Horticulture number, alternatively contact AHDB Horticulture at the address below.

AHDB Horticulture,  
AHDB  
Stoneleigh Park  
Kenilworth  
Warwickshire  
CV8 2TL

Tel – 0247 669 2051

AHDB Horticulture is a Division of the Agriculture and Horticulture Development Board.

**Project Number:** FV 387b

**Project Title:** Leeks: Improving quality and extending the season in late crops in the UK

**Project Leader:** David Norman, Precision Agronomy

**Contractor:** Precision Agronomy

**Industry Representative:** n/a

**Report:** Final Report 2015

**Previous report(s):** Annual Report 2014

**Start Date:** 17/03/2014

**End Date:** 30/11/2015

**Project Cost:** £48,650

# **GROWER SUMMARY**

## **Headline**

Maleic hydrazide applied as the product Fazor, gave a highly significant reduction of bolting in late leeks produced under UK conditions in both years trials. This application technique has the potential to extend the production season of UK by 3-4 weeks, significantly reducing the dependence on leek imports, mainly from Spain, during May and June. In the second year of trials an earlier timing application of gibberellins gave a significant increase in stem length and yield whilst later or multiple applications were ineffective. Overall the effects of gibberellins were relatively inconsistent.

## **Background**

The earlier project FV 387 examined the use of three different growth regulators on leeks applied during the autumn or in the spring. This project concluded that of the three products tested only maleic hydrazide was useful in reducing bolting and that when looking at timing spring applications were the most promising for reducing bolting without adverse crop effects, when compared with autumn applications.

In the follow-on project FV 387a maleic hydrazide was further evaluated using spring application timings only and showed great potential to reduce bolting in over-wintering leeks; however difficulties in the possible registration of maleic hydrazide for leeks led to this project being amended to include a single year's work on gibberellins. Year 2 of FV 387a therefore included looking at the effect of gibberellins on the growth, bolting and quality of UK late leeks, whilst also further examining the effects of maleic hydrazide. The results of gibberellin use were interesting and some treatments increased stem length, but because of variability within the plots there were inconsistencies and the results were not statistically significant.

The Leek Growers Association asked for more work to be done over two years to further evaluate the effects of gibberellins on stem extension in the shorter bold hardy winter leek types, whilst keeping a watching brief on the possible development of maleic hydrazide. This is a two year project extension looking at increased numbers of timings and more replicates over two seasons to investigate whether the stem extension effects can be proved more conclusively. Gibberellins are currently approved for use in two stem vegetables, rhubarb and celery to promote stem extension, but not in leeks.

## Summary

Field trials were carried out over two growing seasons 2013-14 and 2014-15.

In the first season, 2014 harvest, two fields of leeks were used for the trials both of which were the variety Triton. The variety Triton F1 was chosen as it is one of the most winter hardy, and reliable leek varieties, but is also one of the shorter types and can usually only be harvested once there has been a considerable amount of spring re-growth, giving it a very short harvest window. Being able to achieve a longer stem length would open the harvest window considerably and give more reliable cropping at the end of the season. One site was with Nightlayer Leek Company, at Cottenham, near Cambridge and one was with Allpress Farms, near Chatteris.

At each site 9.7% a.i gibberellins as 0.35kg/ha product "Smartgrass" (gibberellins/GA3) were applied at each of the four timings as shown in Table 1. There were two treatments containing Fazor at 4.0kg/ha product (maleic hydrazide 60%) each of these was applied with or without a gibberellin treatment to test possible interactions. This resulted in 9 treatments including untreated controls to give 10 plots in total with three replicates within a fully randomised block design. Applications were made using an Azo precision plot sprayer with a 2M boom. Plot size was 2m by 6m, a water application volume of 400l/ha was used at each time.

**Table 1.** Treatments & Rates Applied

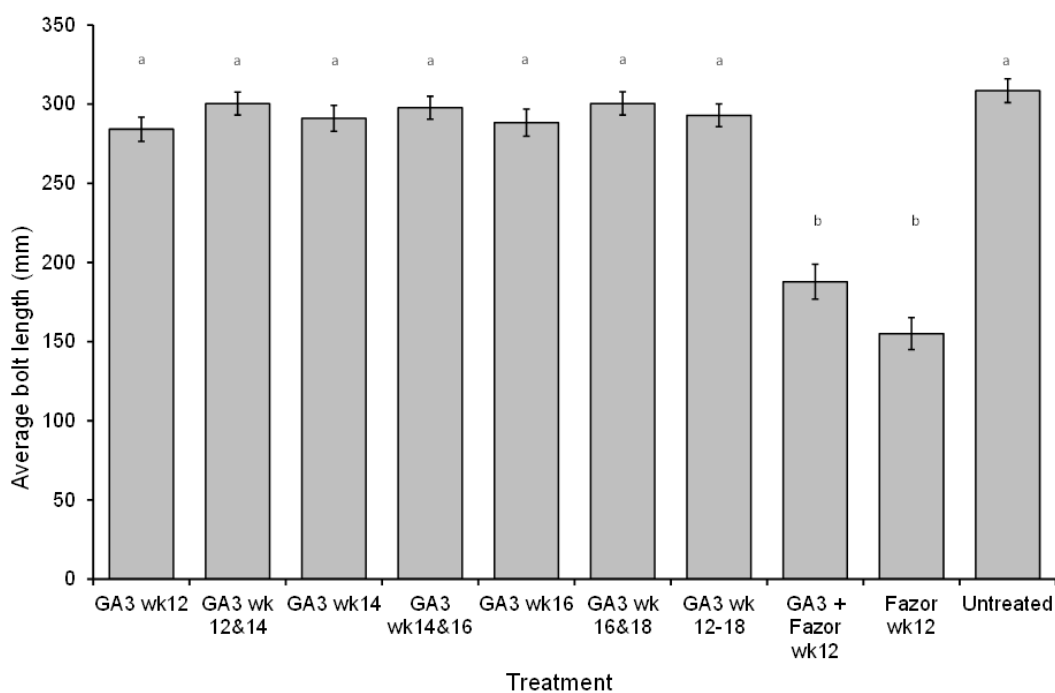
Treatments		Hectare rates	
	Product	Rate ml/gm/ha	Water l/ha
1	GA3 wk12	350	400
2	GA3 wk 12 & wk 14	350	400
3	GA3 wk14	350	400
4	GA 3 wk 14 & wk 16	350	400
5	GA3 wk 16	350	400
6	GA 3 wk 16 & wk 18	350	400
7	GA3 wk 12, 14, 16, & 18	350	400
8	GA3 wk 12 + Fazor wk 12	350 + 4000	400
9	Fazor wk 12	4000	400
10	Untreated		

The plots were harvested at the same time as the surrounding commercial crop, which for the Nightlayer site at Cottenham was 7<sup>th</sup> May 2014. The two centre rows of each plot were lifted

by experienced leek harvest workers, the leeks were weighed, counted and 25 leeks from each plot were measured from base plate to first V (leaf break point) to give the plant height, they were then split in half and the length of the bolt stem was measured separately.

The Allpress farms site was unfortunately mistakenly destroyed just prior to the planned assessment time and so no data could be recorded, this site was successfully repeated along with the planned sites for 2015. So all the planned trials were eventually completed.

None of the treatments showed a significant effect on the leek yield, either as gross weight or as individual plant weight.



**Figure 1:** Treatments that contained Fazor gave a significant reduction in bolting length. So Fazor was very effective in reducing bolting either with or without the addition of gibberellin (treatments that share the same letter above the bar are not significantly different from each other)

When looking at the data on plant height, as measured by length to first V, there were no significant differences.

In the second season, 2015 harvest, three sites were used, one extra to replace the lost site from the 2013-14 season, which this time was successfully harvested. There was one site at Nightlayer Leek, at Cottenham, near Cambridge, and two at Allpress Farms at Upware.

At each site 9.7% a.i gibberellins as 0.35kg/ha product “Smartgrass” (gibberellins/GA3) were applied at each of four timings, the start times were two weeks earlier than in the 2013-14 trials, so applications were started in week 10, week beginning 2<sup>nd</sup> March and then repeated

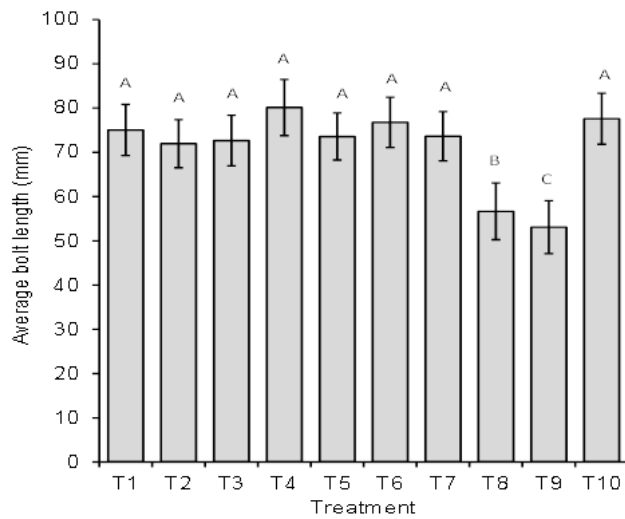
in weeks 12, 14 and week 16. Treatments are shown in Table 2. There were also two treatments containing Fazor at 4.0kg/ha product (maleic hydrazide 60%) each applied in week 12, which has been previously shown to be the best timing, each of these was applied plus or minus a gibberellin treatment to test possible interactions. This resulted in 9 treatments including untreated controls to give 10 plots in total with three replicates within a fully randomised block design. Applications were made using an Azo precision plot sprayer with a 2M boom. Plot size was 2M by 6M, a water application volume of 400l/ha was used at each time.

**Table 2.** Treatments & Rates Applied – All sites

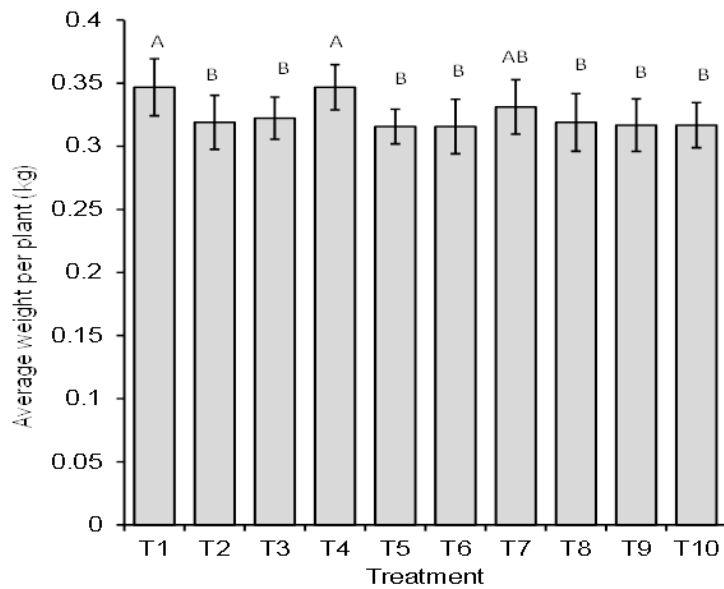
<b>Treatments</b>		<b>Hectare rates</b>	
	<b>Product</b>	<b>Rate ml/gm/ha</b>	<b>Water l/ha</b>
1	GA3 wk10	350	400
2	GA3 wk 10 & wk 12	350	400
3	GA3 wk12	350	400
4	GA 3 wk 12 & wk 14	350	400
5	GA3 wk 14	350	400
6	GA 3 wk 14 & wk 16	350	400
7	GA3 wk 10, 12, 14, & 16	350	400
8	GA3 wk 12 + Fazor wk 12	350 + 4000	400
9	Fazor wk 12	4000	400
10	Untreated		

All sites were successfully harvested at the same time as the surrounding commercial crop.

Site one Nightlayer, Cottenham was harvested on the 22<sup>nd</sup> April 2015, Site two Allpress, Upware was harvested on the 24<sup>th</sup> April 2015 and site three Allpress, Upware was also harvested on 24<sup>th</sup> April 2015. The two centre rows of each plot were lifted by experienced leek harvest workers, the leeks were weighed, counted and 25 leeks from each plot were measured from base plate to first V (leaf break point) to give the plant height, they were then split in half and the length of the bolt stem was measured separately.

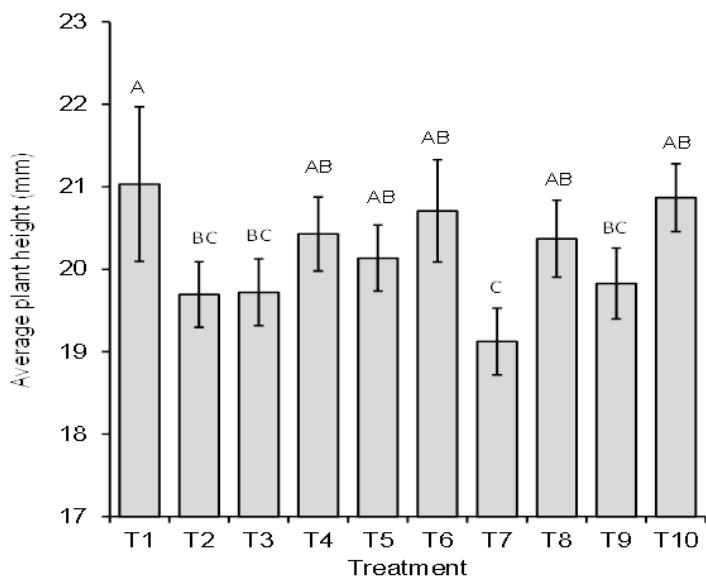


**Figure 2.** Mean bolt length per plant. Treatments containing Fazor (T8/T9) show significantly less bolting than treatments not containing Fazor or the untreated control (treatments which share the same letter are not significantly different from each other)



**Figure 3.** Average plant weight, T1 GA3 wk10 & T4 GA3 wk10+14 gave a heavier plant weight than the other treatments (treatments which share the same letter are not significantly different from each other)





**Figure 4.** Average plant height. T1, GA3 wk10, the earliest timing of gibberellins gave the tallest plants (treatments which share the same letter are not significantly different from each other).

The effects of gibberellins on the increase of shank length were inconclusive in year one, with some variable results and interesting trends but no significant increase proven. In year two an earlier timing of application of gibberellins gave a significant increase in stem length and yield, whilst later timings or multiple applications were ineffective. Overall the effects of gibberellins, whilst interesting, appear too variable and without consistent trends for it to be taken forward as a possible commercial treatment.

### Financial Benefits

Currently the UK supplies home grown leeks from around the 1st July until the end of April in the following year, cold storage can increase the length of supply by a few weeks into May.

Leek production in the post-Christmas period between January and May is unreliable because of the effects of severe frosty weather damaging leeks and the fact that the most frost tolerant varieties tend to have shorter stems which are lower yielding and less favoured by the market. Longer stemmed varieties, more favoured by the market tend to be more frost susceptible as well as being quicker to bolt.

Improving the quality and reliability of late leeks would reduce imports and allow more UK leeks to be grown.

Using this technique could extend the leek season by up to four weeks, potentially allowing yearlong supply of British leeks to consumers when used with the correct storage. Given that the total value of leek production in the UK is currently worth £35,000,000 this could add a further £2-3,000,000 worth of production value to this figure.

## **Action Points**

There are no immediate actions that growers can undertake however, the work has shown that:-

- Maleic hydrazide applied as Fazor at the correct timing reduces bolting in late leek crops
- Spring application has the best effect, around week 12 depending on conditions.
- Approval for maleic hydrazide should be pursued, with a possible collaboration with Belgium for a minor use.
- Results from gibberellins appear inconsistent.

