



Agriculture & Horticulture
DEVELOPMENT BOARD



Grower Summary

FV 413

A review of the agronomic
factors that influence
postharvest pinking in lettuce

Final 2013

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Headline

Following harvest some lettuce can produce pink colouring in the butt and ribs of the outer leaves. This is termed 'pinking' and, in spite of the development of new varieties with claims of reduced pinking, it continues to present substantial problems for producers of both UK and imported crops. Poor product on the shelf reduces sales and leads to complaints and consumer dissatisfaction. However, we do not have a good predictive system for this disorder; growers instead have to rely on gut-feelings and experience rather than having an informed best management strategy for this problem. There are suggestions in the literature that nutrition, high rainfall/over irrigation and temperature can have an influence on the expression of pinking along with physical damage at harvest. This study provides an overview of the underlying physiology of pinking; summarises the information available on the agronomic causes of pinking and recommends actions that growers could take to reduce pinking.

Key messages

- Growers should select cultivars with reduced pinking susceptibility.
- Care needs to be exercised when harvesting wholehead lettuce to minimise handling damage as wounding/bruising lettuce ribs can increase pinking.
- High levels of nitrogen (N) can increase pinking; growers need to optimise nitrogen application to prevent excessive levels of N being available to the crop. Particular care will be needed in crops grown on soils with high levels of residual N.
- Growers should consider whether phosphorus (P) nutrients have been optimised for lettuce as P nutrition may have a role in reducing pinking.
- Crop water status needs to be managed closely. Excess irrigation (and rainfall) can increase pinking.
- High temperatures 1-2 weeks before harvest can increase pinking and growers can monitor the climate of the growing crop to get an early warning of pinking potential. This may allow a temporary reduction in product-life to minimise wastage in the supply chain.

- There is no scientific evidence to support the commonly held belief that over mature heads having a greater pinking risk.

Key research needs

This review has identified a number of agronomic factors that have been reported as influencing pinking in lettuce. Some of these factors, such as temperature or rainfall, cannot be manipulated by growers but knowledge of their effects could be used to manage product shelf-life through the supply chain.

- **Work on predictive models that utilise local meteorological data is needed to allow growers to identify high risk crops.**

Wounding, nutrition and irrigation have been reported to be key factors in subsequent pinking.

- **In-field harvesting and handling systems that minimise damage to the ribs of leaves are needed to minimise pinking linked with wounding.**

High rates of nitrogen and irrigation have been associated with an increase in pinking but the interaction with other nutrients is not clear. It is not possible to identify an optimal nutrient regime or irrigation schedule from the research reviewed here.

- **Further research on optimal irrigation and nutrition regimes is needed to give growers confidence to adjust treatments.**

Reducing pinking in lettuce may require a mix of agronomy and genetic approaches. Identifying the agronomic conditions that reduce and conversely increase pinking will be of interest to researchers studying the genetic factors underlying cultivar responses.

- **Work linking environmental factors to genetic control of pinking (i.e. phenotyping in diverse environments) is needed for breeders to develop more resilient lettuce cultivars for the UK industry.**