



Grower Summary

FV/PE 455

**Determining the basis of variation
in herb flavour**

Annual report 2021

Project title: Determining the basis of variation in herb flavour

Project number: FV/PE 455

Project leader: Prof Carol Wagstaff, University of Reading

Report: Annual report, February 2021

Previous report: Annual report, March 2020

Key staff: Ana Contente
Dr Maria-Jose Oruna-Concha

Location of project: University of Reading

Industry Representative: Philip Dodd, Herbs Unlimited, York

Date project commenced: 12th March 2018

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 2021. 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.

All other trademarks, logos and brand names contained in this publication are the trademarks of their respective holders. No rights are granted without the prior written permission of the relevant owners.

The results and conclusions in this report are based on an investigation conducted over a one-year period. The conditions under which the experiments were carried out and the results have been reported in detail and with accuracy. However, because of the biological nature of the work it must be borne in mind that different circumstances and conditions could produce different results. Therefore, care must be taken with interpretation of the results, especially if they are used as the basis for commercial product recommendations.

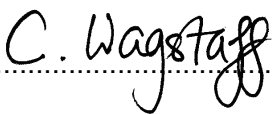
AUTHENTICATION

We declare that this work was done under our supervision according to the procedures described herein and that the report represents a true and accurate record of the results obtained.

Professor Carol Wagstaff

Principal Investigator, Head of School Chemistry, Food and Pharmacy

University of Reading]

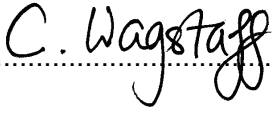
Signature  Date ..16th April 2021.....

Report authorised by:

Professor Carol Wagstaff

Principal Investigator, Head of School Chemistry, Food and Pharmacy

University of Reading]

Signature  Date ..16th April 2021.....

GROWER SUMMARY

Headline

Elucidating the volatile and non-volatile profile of culinary herbs and understanding how this profile varies with season and production method will help growers understand how these factors affect the flavour of the product. This will direct growing practices that will improve consumer satisfaction of the herbs, leading to market growth for growers.

Background

Herb flavour can vary in its composition as well as intensity. This variation can happen as a result of different cultivars, agronomic practices, season and climate. There has been an increase in the consumption of fresh culinary herbs due to pressure to reduce salt content in foods whilst retaining a flavourful eating experience, so the flavour is the most important attribute of the herbs. Therefore, understanding how flavour varies in composition and abundance within a herb species as a result of different production systems and climate conditions, and how these differences are perceived by consumers, will help the growers to adjust their practice to enable the industry to deliver a more consistent and acceptable product.

The overall aim of this 4-year PhD study is to elucidate the chemical profile of commercially important culinary herb crops and understand how season, agronomic practice, cultivation system and environment interact with this. The focus of work in this project year was to gain an initial understanding of how variable flavour chemistry is between different seasons and years, and how production systems influence herb flavour. This analysis was done using herb samples collected in 2018 and 2019.

Summary

Three different herbs were selected as being of the greatest commercial relevance and covering both annual, perennial, soft and woody herbs: basil, coriander and rosemary. Sample cultivar was consistent for basil and coriander, but less so for rosemary. The project steering group provided a number of sites giving rise to a breadth of production methods that were sampled from West Sussex, Lincolnshire, Berkshire, Worcestershire, Norfolk and Yorkshire. These sites provided samples covering herbs produced in protected conditions under glasshouse, grown in pots (Pots), soil (Soil) or hydroponic system (Hydroponics). Samples grown on outside fields (Field) were also provided for analysis. Not all the production types were analysed for each of the three herbs, as this depended on which herb crops the

sites produced. Analysis was carried out across two years (2018 and 2019) and samples were analysed for the summer and autumn season. Because not all the samples were supplied for every season, Table 1 lists the herbs that were analysed in each season as well as the production method.

Table 1. List of herbs and their production systems that were analysed during 2018 and 2019 seasons.

| | Summer 2018 | Autumn 2018 | Summer 2019 | Autumn 2019 |
|--|--|--|--|---|
| Rosemary <i>Rosmarinus officinalis</i> var. unknown | Pots Soil Field 1 Field 2 Field 3 Field 4 | Pots Soil Field 1 Field 2 Field 3 Field 4 | Pots Soil Field 4 | Pots Soil Field 1 Field 3 Field 4 |
| Coriander <i>Coriandrum sativum</i> var. Cruiser | Pots 1 Pots 2 Field 1 Field 2 Field 3 | Pots 1 Pots 2 Field 1 Field 2 | Pots 1 Pots 2 Field 1 Field 2 | Pots 1 Pots 2 Field 1 Field 2 Field 3 |
| Basil <i>Ocimum basilicum</i> var. Sweet Genovese | Pots 1 Pots 2 Hydroponics Soil | Pots 1 Pots 2 Hydroponics | Pots 1 Pots 2 Hydroponics | Pots 1 Pots 2 Hydroponics |

Sampling from all production methods has so far been conducted to represent Summer and Autumn production systems. Results so far indicate that pot produced herbs are significantly different from the rest production types, variety of the herb (in the case of rosemary) shows to be relevant when analysing the flavour, confirming what is found in literature.

Clear differences were seen between samples produced in the year of 2018 and 2019, the reason for these differences might be due to the higher average temperature occurred in the year of 2018. This confirms what is found in the literature, where temperature is described as being relevant to the flavour composition and also volatiles losses.

From the results, season of production also influences the flavour profile of the samples, when the samples are produced in unprotected conditions, this might be due to these herbs being exposed to the environment conditions causing stress to the plant, therefore higher content in aroma compounds.

Results so far confirm that variables during production influence the flavour profile, however further analysis need to be done in order to understand better how other variables might be influencing the flavour. Another year of sampling needs to be completed in order to give more insight into the differences seen between years of production.

From the results so far, it has been possible to observe some differences between samples from the different sites:

- Variety influences the flavour. Rosemary samples were not from the same variety which might be the main cause for the differences.
- Pot produced herbs showed significant differences when compared with other types of production, such as being grown in an outside field, or in soil under a protected environment (glasshouse) or using hydroponic systems (basil samples only).
- Herbs produced during the summer season showed differences in the flavour profile compared to the herbs produced in the autumn season.
- Differences in the flavour profile were observed between samples produced in the year of 2018 and 2019.
- The temperatures under which samples were produced and transported affects the flavour composition of herbs produced in unprotected systems.
- More variables of production, such as lighting, water supply and soil type, need to be analysed in order to better understand what is influencing the volatile profile of each herb.

Financial Benefits

This project will provide UK herb growers with information to help them understand better the variations in their product, and in doing so, help to deliver a more consistent product throughout the year.

Action Points

None to date