Precision Dosing of Fruit Trees to Optimise Yield and Quality

Rob Saunders
Innovation Funding Service 104610
Review

Quantifying key parameters as elicitors for alternate fruit bearing in cv. ‘Estar’ apple trees

Anne-Lena Krasniqi, Lutz Damerow, Achim Kunz, Michael M. Blanke

INRES – Horticultural Science, University of Bonn, Germany

ARTICLE INFO

Article history:
Received 28 March 2013
Received in revised form 16 July 2013
Accepted 18 July 2013
Available online 3 August 2013

Keywords:
Abiotic stress
Climate change
Flower initiation
GA7 (gibberellin)
Thinning
Precision horticulture

ABSTRACT

The commonly known alternate bearing, i.e. year-to-year change of large and small yields of fruit tree crops worldwide, is often induced by abiotic stress such as late frost, which will eliminate flowers or fruitlets. This study presents an alternative form, biennial biennial bearing, i.e. change of large and small yields of the same trees within the same tree row in the same year. Three methods were developed or modified for the analysis of the number of flower clusters and yield of 2086 apple (Malus domestica Borkh.) cv. ‘Estar’ trees. The first method, i.e., based on intersect between yield in year x and year x + 1 and flower clusters in year x, yielded 91–106 flower clusters, whereas the second method, i.e., mean yield in year x and year x + 1, resulted in a range of 72–133 flower clusters, or 9.6 kg/tree necessary for sustainable cultivation of apple cv. ‘Estar’. The third ‘biennial bearing index’ (BBI), was calculated in three ways as the ratio of differences in tree yields to cumulative tree yield, for individual trees (rather than orchard average) to demonstrate the tree-to-tree alternation. A scheme for the possible underlying regulatory mechanisms was developed, which includes potential elicitors such as light deprivation and subsequent lack of flower initiation, are discussed as a possible result of polar basipetal GA7 transport, cytokinin level in the xylem and phloem and down-regulation of the gene expression of the flowering gene. Suggested countermeasures included early chemical or mechanical thinning.
Blossom Density Map

Outfield Partner Farm - Kent, UK
Survey: 01 May 2019

Prepared from Outfield UAV data
Prepared: 03 June 2019

Tree Blossom Density
- Low
- Medium
- High

0 20 40 m
Differential Dose Sprayer Control System

Intensity Maps

LIDAR image

Algorithm

Differential Dose Sprayer Control System
Precision Dosing of Fruit Trees to Optimise Yield and Quality

Rob Saunders
Innovation Funding Service 104610
Precision Dosing of Fruit Trees to Optimise Yield and Quality

Rob Saunders

Innovation Funding Service 104610
Precision Dosing of Fruit Trees to Optimise Yield and Quality

Rob Saunders
Innovation Funding Service 104610
Precision Dosing of Fruit Trees to Optimise Yield and Quality

Rob Saunders
Innovation Funding Service 104610
Precision Dosing of Fruit Trees to Optimise Yield and Quality

Rob Saunders
Innovation Funding Service 104610
Precision Dosing of Fruit Trees to Optimise Yield and Quality

Rob Saunders
Innovation Funding Service 104610