

1

Supplementary material

2 **Bioaccessibility of essential lipophilic nutrients in a chloroplast-rich fraction (CRF)** 3 **from agriculture green waste during simulated human gastrointestinal tract digestion**

4 Jutarat Wattanakul^{a,b} (jutarat.w@mail.rmutk.ac.th), Mansor Syamila^{a,c}
5 (syamila.mansor@usim.edu.my), Randa Darwish^a (randa.darwish@nottingham.ac.uk),
6 Mohamed A. Gedi^a (mohageedi@gmail.com), Poramat Sucharit^a
7 (poramat.sucharit@nottingham.ac.uk), Chao chi^a (chao.chi@nottingham.ac.uk), Patchaniya
8 Akepach^{a,d} (patchaniya.ake@sru.ac.th), Moulay Sahaka^e (sahakamoulay@gmail.com),
9 Brigitte Gontero^e (bmeunier@imm.cnrs.fr), Frédéric Carrière^e (carriere@imm.cnrs.fr), David A.
10 Gray^{a*} (david.gray@nottingham.ac.uk)

11 ^a Division of Food, Nutrition and Dietetics, School of Biosciences, University of Nottingham, Sutton
12 Bonington Campus, Loughborough, Leicestershire, LE12 5RD, United Kingdom.

13 ^b Department of Food Science and Technology, Faculty of Home Economics Technology, Rajamangala
14 University of Technology Krungthep, Bangkok, 10120, Thailand.

15 ^c Universiti Sains Islam Malaysia, Bandar Baru Nilai, 78100 Nilai, Negeri Sembilan, Malaysia.

16 ^d Department of Food Innovation and Nutrition, Faculty of Science and Technology, Suratthani Rajabhat
17 University, Surat Thani, 84100, Thailand.

18 ^e Aix Marseille Univ, CNRS, UMR7281 Bioénergétique et Ingénierie des Protéines, 31 Chemin Joseph
19 Aiguier, 13402 Marseille, Cedex 09, France.

20 Corresponding author's telephone: +44(0) 115 951 6147

21

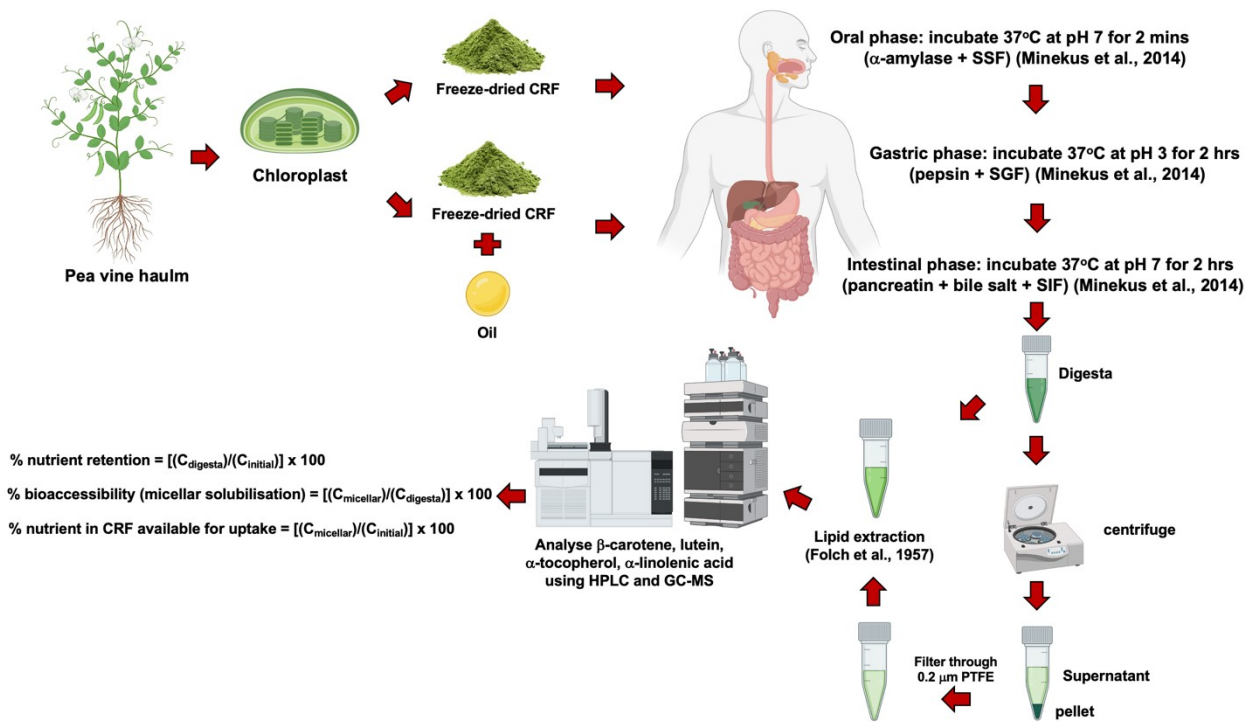
22

23

24

25 * Corresponding author

26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48



Supplementary Figure 1: Flow chart of the study of bioaccessibility of essential lipophilic nutrients.

49 **Supplementary Table 1:** % Peroxidase reduction of each treatment of pea vine juice (HPVH: Heated
50 PVH before juicing and HJ: heated PVH juice)

Treatment	% Peroxidase reduction
HPVH	66.5%
HJ	100%

51

52

53

54

55

56

57

58

59

60

61

62

63

64

65

66

67

68

Oral

Gastric

Intestine (complete digesta)

69

70

71

FJ

72

73

74

HPVH

75

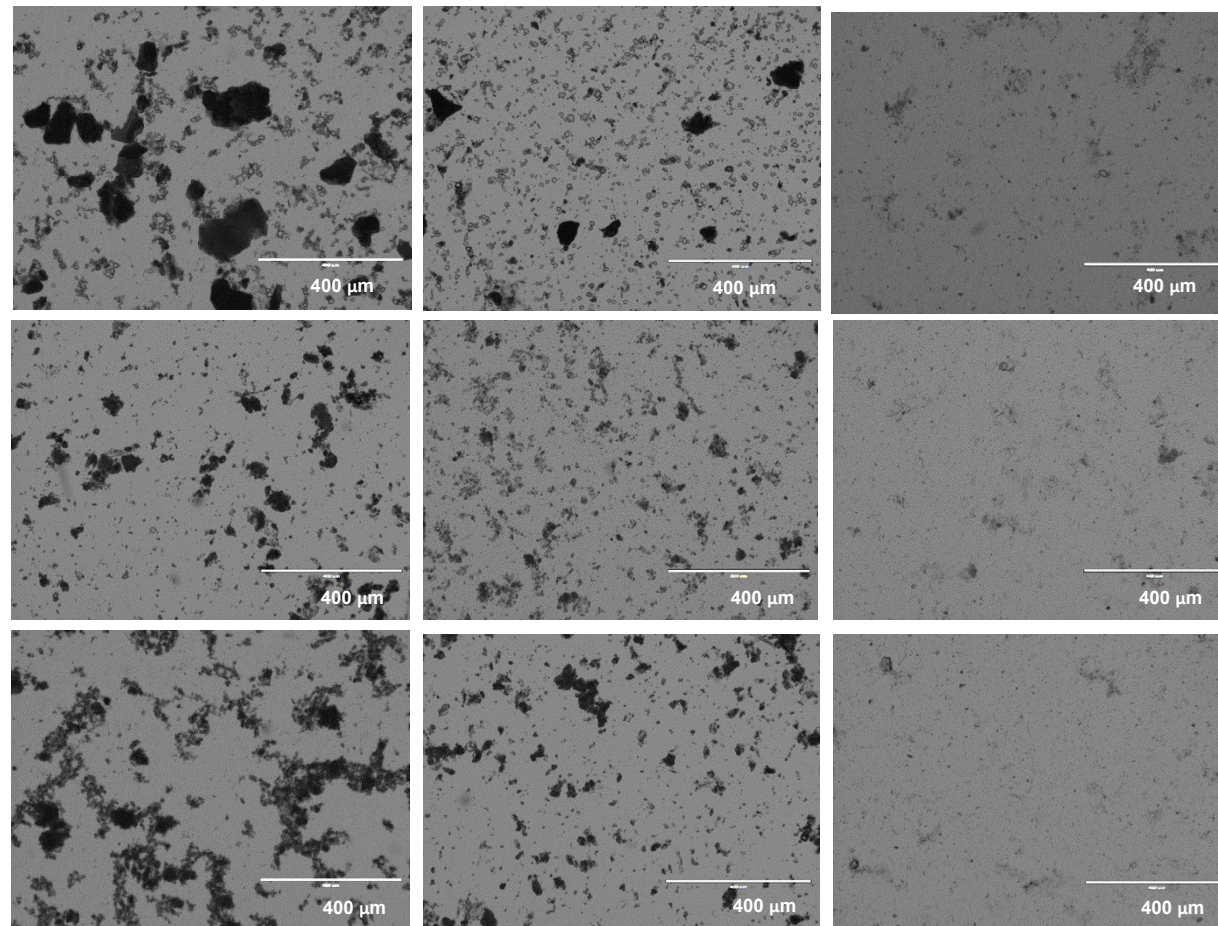
76

77

78

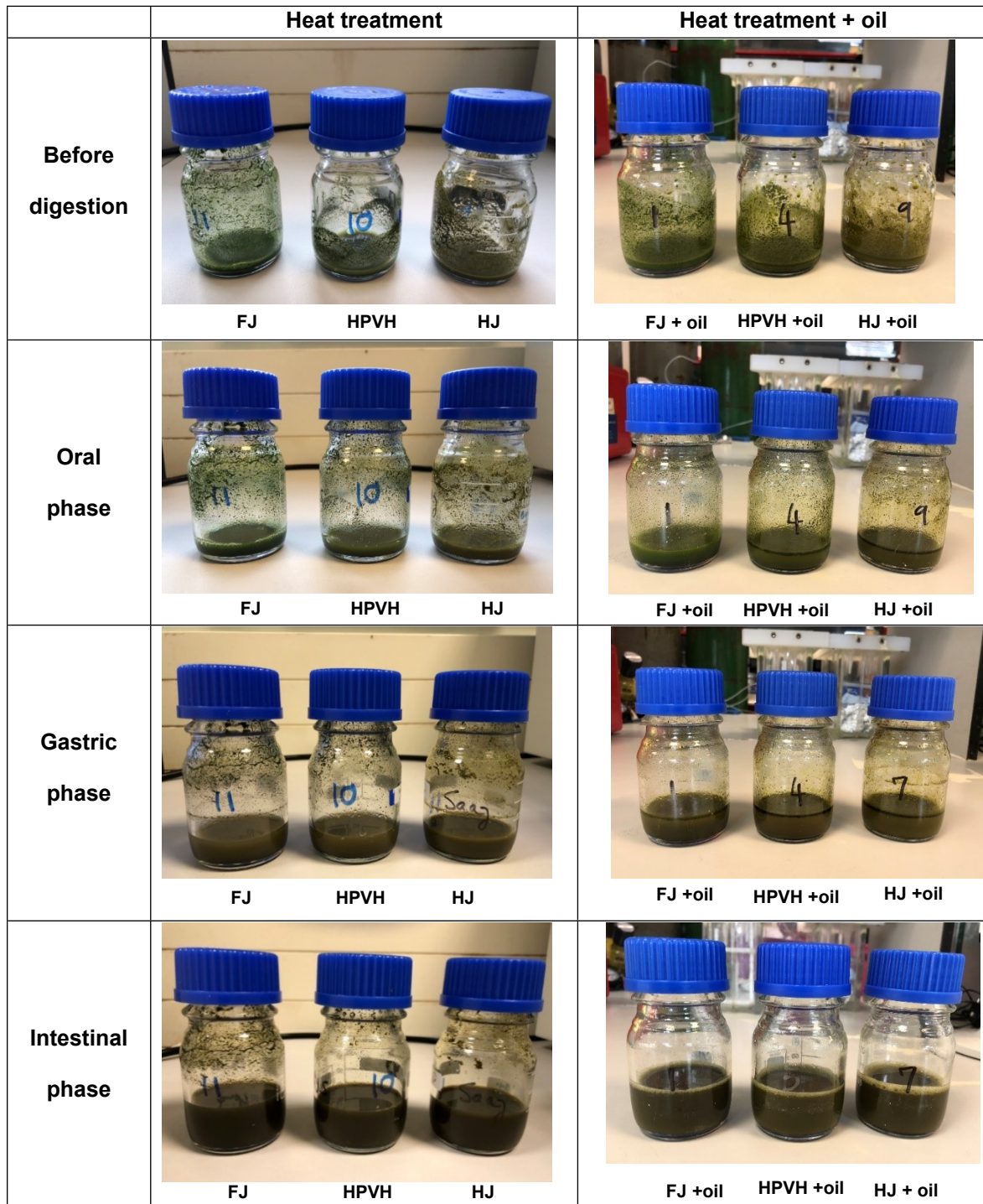
HJ

79



Supplementary Figure 2: Light Microscope images of CRF with different treatments, including fresh PVH juice (FJ), heated PVH (HPVH) and heated juice (HJ) at different stages: oral (2 min), gastric (2 hr), and intestine (2 hr).

80



81

82 **Supplementary Figure 3:** Before and after digestion of CRF from PVH in each stage, including oral,
 83 gastric and intestinal phases; FJ: fresh juice; HPVH: heated PVH; HJ: heated juice; oil: rapeseed oil.

84

85

86

87

88

89

90

91

92

93

94

95

96

97

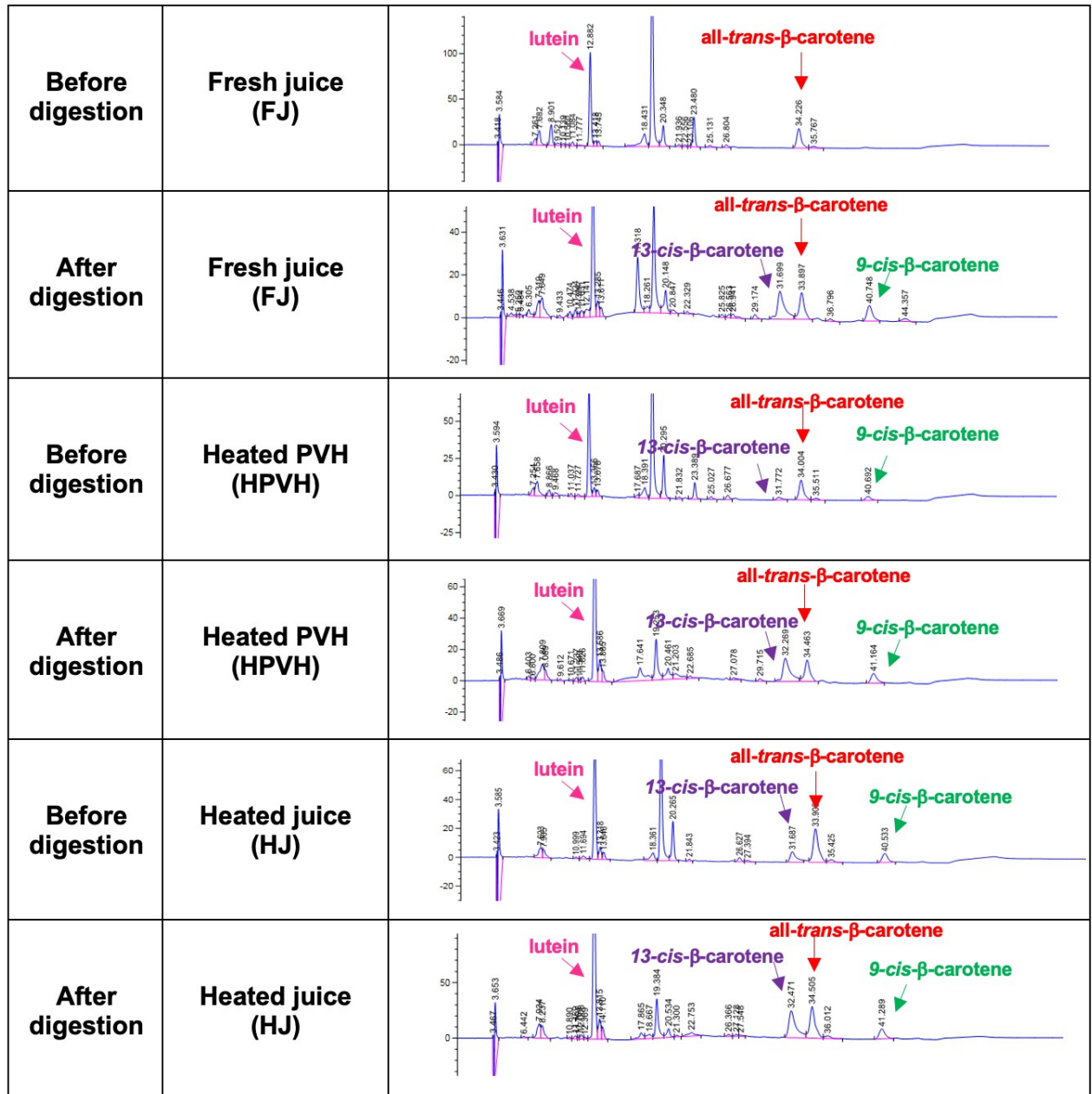
98

99

100

101

102

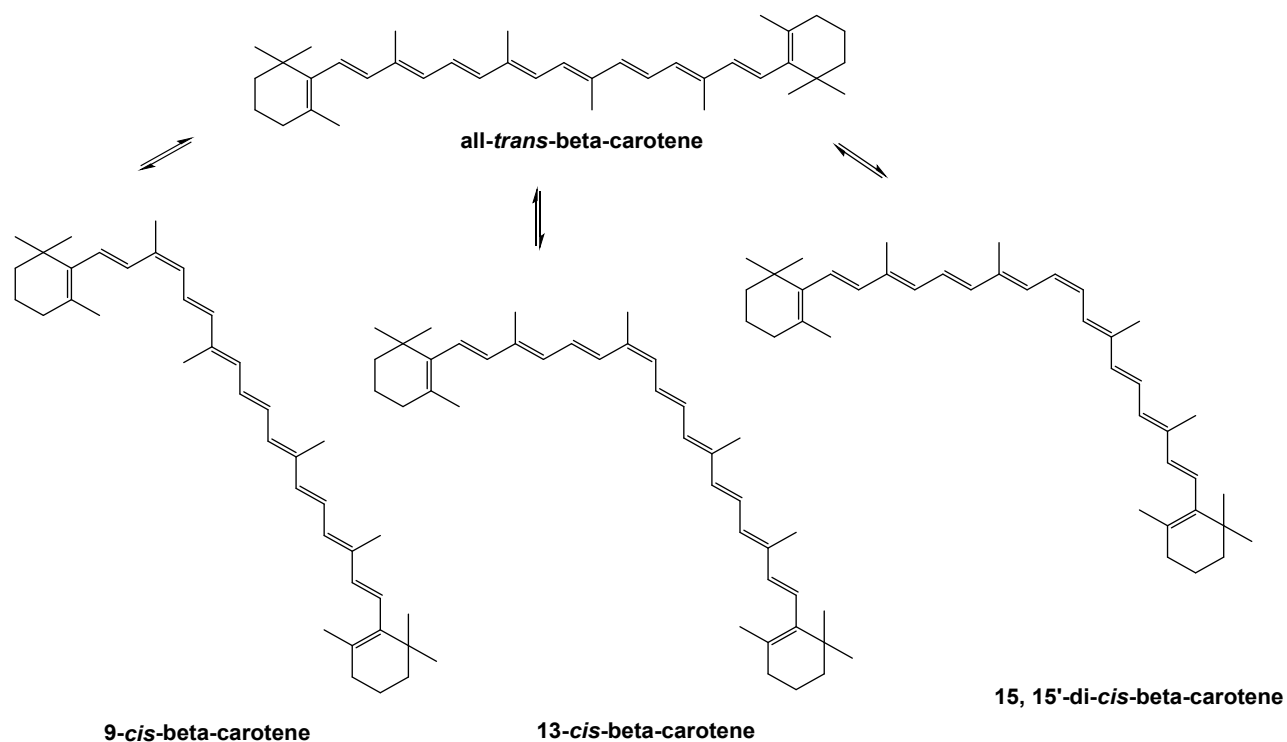
103 **Supplementary Figure 4:** Chromatogram of β -carotene of CRF from PVH both before and after

104 digestion (the scale of chromatogram before and after digestion is not consistent and the size of the

105 peak should not be compared directly to each other due to a difference in dilution factor.

106

107



108
109

110 **Supplementary Figure 5:** Chemical structures of isomerisation of β -carotene.

111