

Supplementary Material

Comparison of quality and microstructure of strawberry powders prepared by two different drying methods: low temperature drying with convection dryer and vacuum freeze drying

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Figure S1. SEM micrographs of the microstructure of strawberry powders obtained by LTD and vacuum FD.

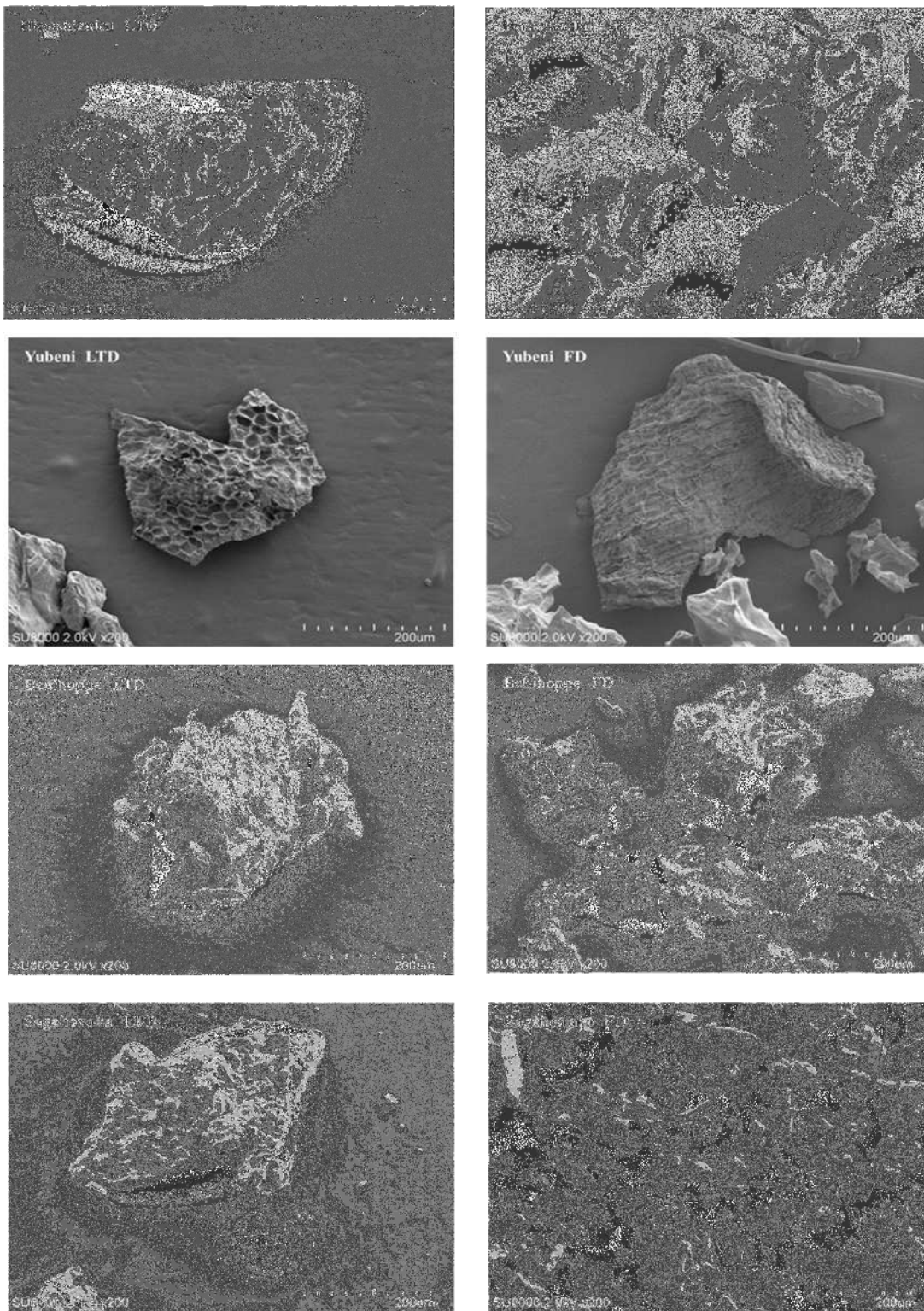


Figure S2. SEM micrographs of the microstructure of strawberry powders obtained from different hot air dryer models.

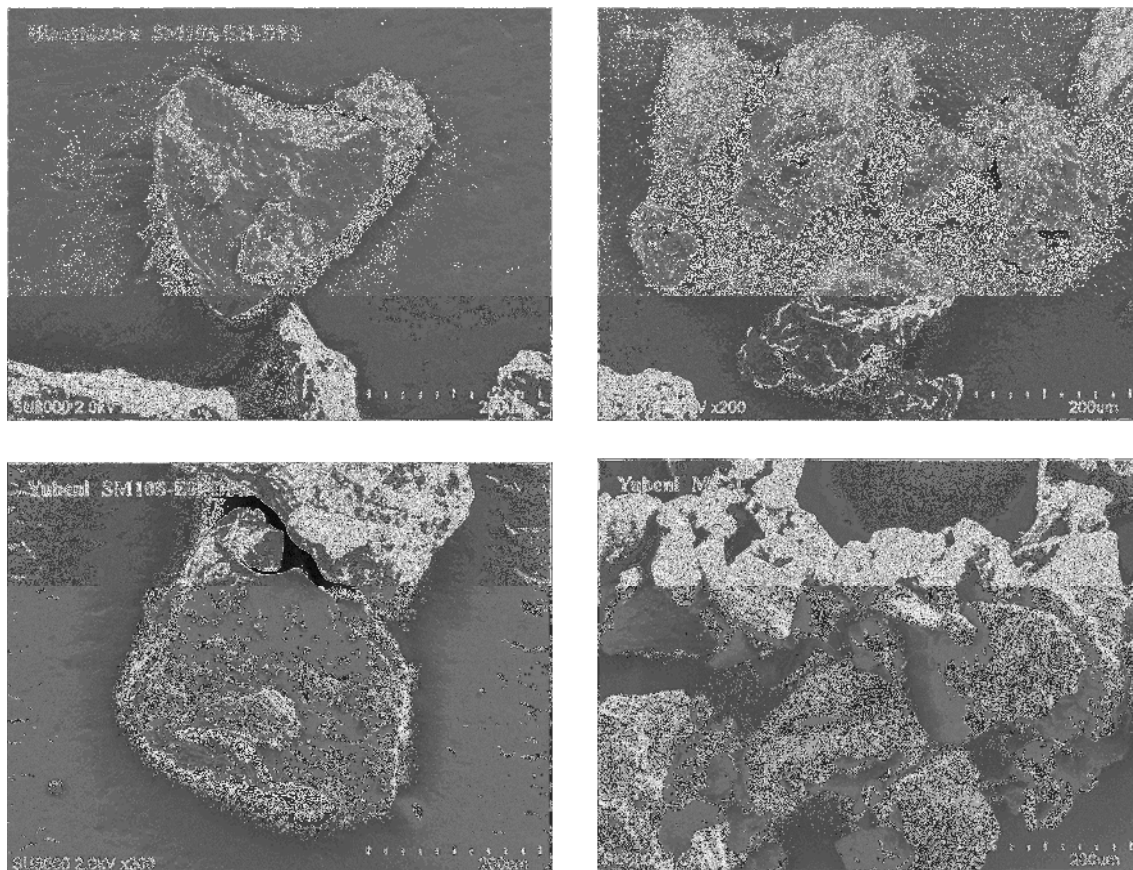


Table S1. Properties of mature strawberries

Cultivar	Main production region	Property		
		Sugar content (Brix) ^{a)}	Citric acid (mg%)	Glutamic acid (mg%)
Hinoshizuku	Kumamoto prefecture	9.8 ± 0.10	698.4 ± 10.36	24.5 ± 0.36
Yubeni	Kumamoto prefecture	8.4 ± 0.04	606.7 ± 5.53	24.2 ± 0.24
Benihoppe	Shizuoka prefecture	10.2 ± 0.10	706.2 ± 22.01	37.1 ± 1.94
Sagahonoka	Saga prefecture	8.0 ± 0.06	534.5 ± 0.936	56.1 ± 0.27

a) Concentration (wt%) of solid matter in liquid solution by refractometer.

Table S2. Moisture loss of strawberry powders by LTD and vacuum FD method.

Variety	Moisture removal efficiency (%)	
	LTD	FD
Hinoshizuku	88.90 ± 0.87	88.28 ± 0.51
Yubeni	90.25 ± 0.57	89.98 ± 0.45
Benihoppe	89.09 ± 0.72	88.47 ± 0.41
Sagahonoka	91.21 ± 0.15	90.91 ± 0.64

Table S3. Moisture loss of strawberry powder by hot dryer model SM10S-EH-DPC and MC-1.

Variety	Moisture removal efficiency (%)	
	SM10S-EH-DPC	MC-1
Hinoshizuku	88.90 ± 0.87	88.90 ± 0.82
Yubeni	90.25 ± 0.57	90.29 ± 1.25

Table S4. Color measurement of strawberry powders obtained by LTD and vacuum FD.

Method	Variety	L^*	a^*	b^*	a^*/b^*
LTD	Hinoshizuku	46.98 ± 1.43	26.56 ± 1.00	20.47 ± 1.14	1.30 ± 0.09
	Yubeni	51.27 ± 1.32	33.04 ± 1.21	23.56 ± 1.20	1.40 ± 0.03
	Benihoppe	48.19 ± 1.34	36.73 ± 1.15	26.45 ± 4.27	1.41 ± 0.22
	Sagahonoka	51.47 ± 1.20	21.34 ± 0.85	28.08 ± 1.39	0.76 ± 0.01
FD	Hinoshizuku	53.15 ± 1.53	45.74 ± 1.69	20.71 ± 0.75	2.21 ± 0.01
	Yubeni	55.92 ± 2.38	44.80 ± 1.08	18.27 ± 0.09	2.45 ± 0.05
	Benihoppe	55.67 ± 2.46	44.24 ± 0.92	18.54 ± 0.15	2.39 ± 0.05
	Sagahonoka	62.68 ± 2.47	36.92 ± 0.85	15.06 ± 0.08	2.45 ± 0.06

Table S5. Color measurement of strawberry powders obtained by different models of hot air dryer.

Dryer	Variety	L^*	a^*	b^*	a^*/b^*
SM10S-EH	Hinoshizuku	46.98 ± 1.43	26.56 ± 1.00	20.47 ± 1.14	1.30 ± 0.09
-DPC	Yubeni	51.27 ± 1.32	33.04 ± 1.21	23.56 ± 1.20	1.40 ± 0.03
MC-1	Hinoshizuku	51.43 ± 0.89	25.81 ± 1.36	20.78 ± 1.43	1.24 ± 0.02
	Yubeni	56.11 ± 1.72	31.86 ± 0.87	22.63 ± 0.98	1.41 ± 0.03

Table S6. WHC and WSI values obtained from LTD and vacuum FD.

Variety	WHC (g-H ₂ O/g.)		WSI (%)	
	LTD	FD	LTD	FD
Hinoshizuku	1.36 ± 0.200	1.41 ± 0.141	57.19 ± 5.18	60.43 ± 1.81
Yubeni	1.71 ± 0.090	1.92 ± 0.188	57.47 ± 1.22	58.46 ± 1.44
Benihoppe	2.03 ± 0.098	2.34 ± 0.157	54.36 ± 1.96	51.67 ± 3.40
Sagahonoka	1.38 ± 0.066	1.48 ± 0.223	60.70 ± 0.78	63.95 ± 2.33

WHC: water holding capacity, WSI: water solubility index

Table S7. WHC and WSI values obtained from different hot air dryer models.

Variety	WHC (g-H ₂ O/g)		WSI (%)	
	SM10S-EH-DPC	MC-1	SM10S-EH-DPC	MC-1
Hinoshizuku	1.37±0.200	1.38 ± 0.134	57.19 ±5.18	61.74 ± 2.61
Yubeni	1.71 ± 0.090	1.79 ± 0.237	57.47 ± 1.22	58.61 ± 0.41

Table S8. Organic acid content of strawberry powders obtained by LTD and vacuum FD.

Variety	Malic acid (g/100 g-dry weight)		Citric acid (g/100 g-dry weight)	
	LTD	FD	LTD	FD
Hinoshizuku	1.81 ± 0.043	2.17 ± 0.003	5.03 ± 0.025	6.37 ± 0.015
Yubeni	2.23 ± 0.021	2.72 ± 0.019	3.95 ± 0.048	6.27 ± 0.021
Benihoppe	0.99 ± 0.026	1.55 ± 0.097	5.85 ± 0.060	6.63 ± 0.183
Sagahonoka	1.31 ± 0.011	2.06 ± 0.035	4.58 ± 0.090	5.43 ± 0.087

Table S9. Amino acid content of strawberry powders obtained by LTD and vacuum FD.

Variety	Asparagine (mg/100 g-dry weight)		Glutamine (mg/100 g-dry weight)	
	LTD	FD	LTD	FD
Hinoshizuku	735.8± 29.56	566.4 ± 5.06	329.6 ± 14.76	222.5 ± 19.38
Yubeni	429.69 ± 1.68	526.5 ± 7.16	268.7 ± 1.46	249.8 ± 3.61
Benihoppe	605.8 ± 11.85	438.6 ± 10.13	420.1 ± 26.69	383.2 ± 10.53
Sagahonoka	1003.6 ± 10.90	1187.8 ± 207.95	361.2 ± 6.05	666.5 ± 140.62