

Article

# Enzymatic Reaction-related Protein Degradation and Proteinaceous Amino Acid Metabolism during the Black Tea (*Camellia sinensis*) Manufacturing Process

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## Supplementary Information

**Table S1.** The changes of water content in tea leaves during black tea manufacturing process.

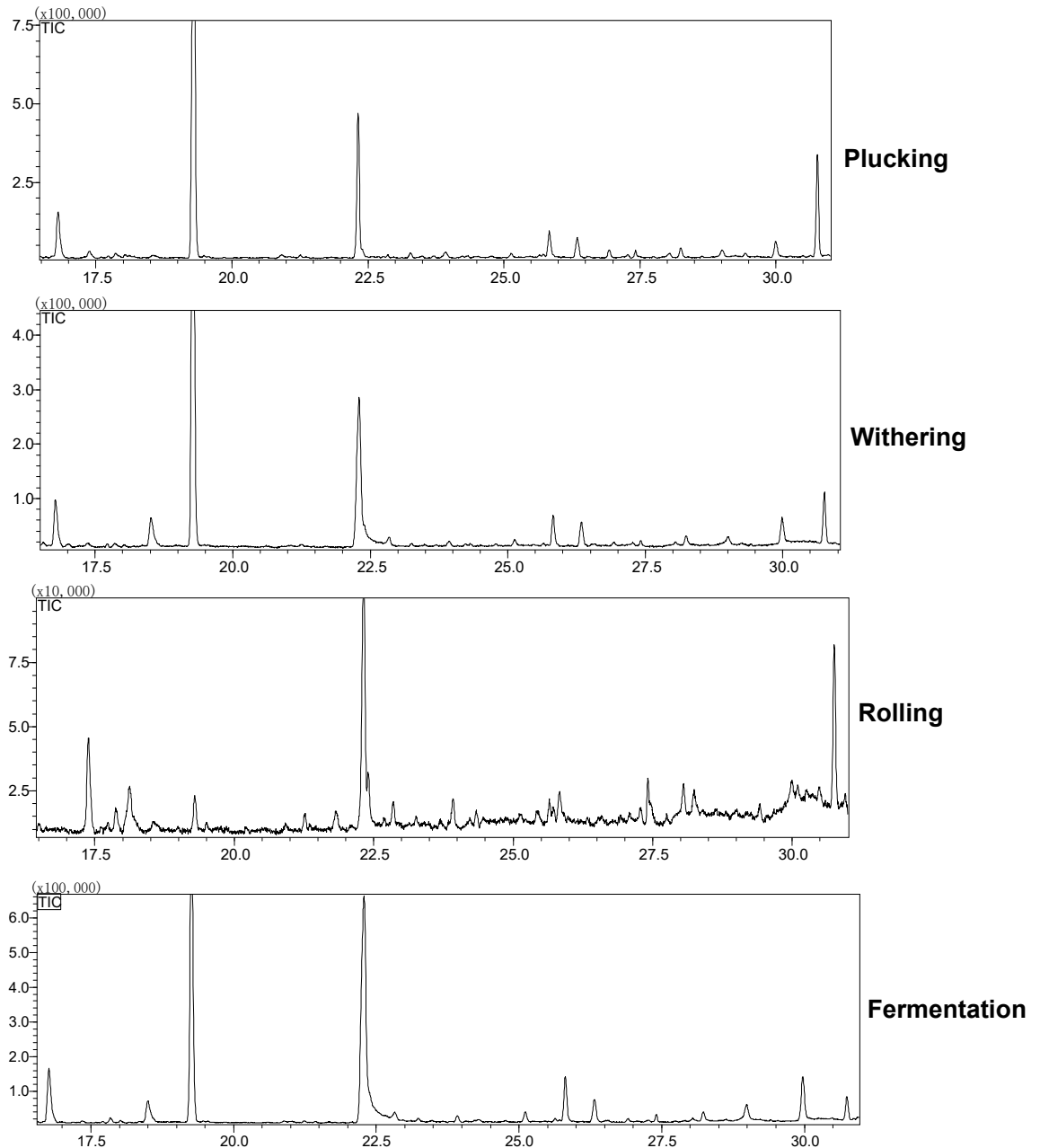
	Plucking	Withering	Rolling	Fermentation	Drying
Water content (%)	78.03 ± 0.02	56.11 ± 0.04	51.42 ± 0.04	50.93 ± 0.01	5.36 ± 0.06

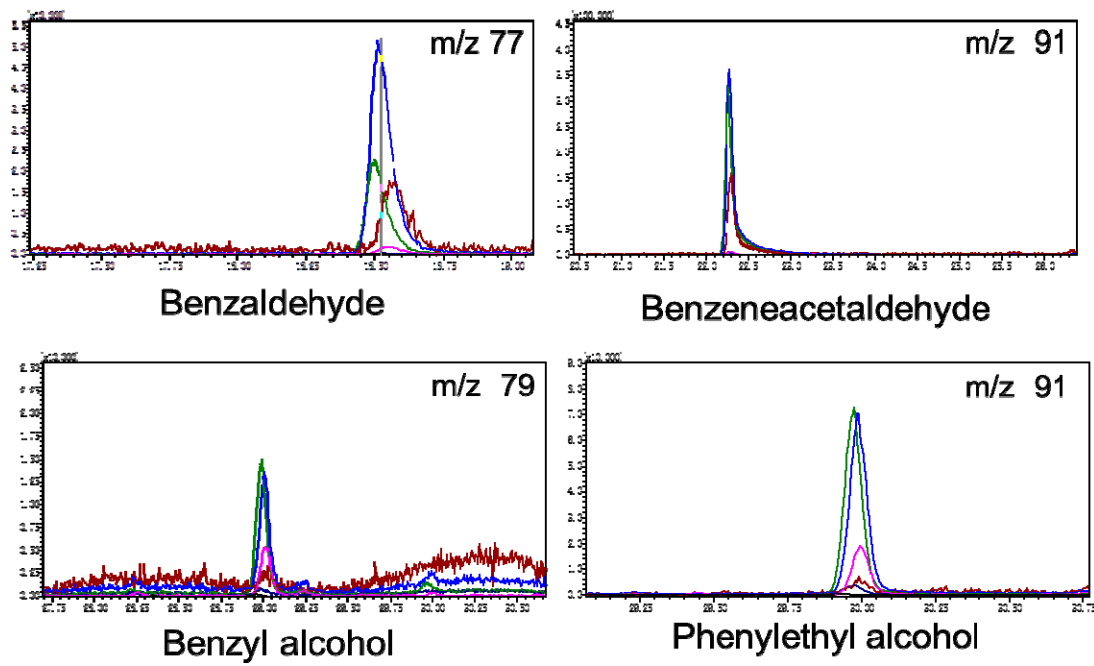
**Table S2.** Contents of free amino acids in tea leaves of simulated the black tea fermentation.

Amino acid µg/g (Dry weight)	Fresh tea leaves (0h)	Fermentation (6h)	
		Intact	Crushed
P-Ser	130.16 ± 2.96 <sup>ab</sup>	145.18 ± 10.95 <sup>a</sup>	175.85 ± 43.04 <sup>a</sup>
PEA	132.48 ± 6.81 <sup>b</sup>	193.80 ± 31.08 <sup>a</sup>	14.47 ± 4.05 <sup>c</sup>
Asp	14.67 ± 4.98 <sup>b</sup>	22.83 ± 3.13 <sup>a</sup>	18.73 ± 8.30 <sup>ab</sup>
Thr	147.39 ± 43.53 <sup>a</sup>	182.56 ± 25.59 <sup>a</sup>	154.16 ± 38.64 <sup>a</sup>
Ser	190.70 ± 15.82 <sup>c</sup>	264.17 ± 13.03 <sup>b</sup>	441.50 ± 52.06 <sup>a</sup>
Asn	75.14 ± 19.21 <sup>b</sup>	311.48 ± 33.49 <sup>a</sup>	77.84 ± 49.18 <sup>b</sup>
Glu	1220.89 ± 144.98 <sup>b</sup>	1364.41 ± 282.47 <sup>b</sup>	2072.11 ± 423.79 <sup>a</sup>
Thea	4546.86 ± 1024.10 <sup>a</sup>	5102.98 ± 681.50 <sup>a</sup>	6097.05 ± 1681.02 <sup>a</sup>
α-AAA	29.86 ± 26.61 <sup>b</sup>	82.25 ± 17.51 <sup>a</sup>	11.53 ± 9.91 <sup>b</sup>
Gly	35.53 ± 0.81 <sup>a</sup>	34.09 ± 28.49 <sup>a</sup>	40.23 ± 7.11 <sup>a</sup>
Ala	101.06 ± 13.44 <sup>b</sup>	125.77 ± 28.12 <sup>b</sup>	274.45 ± 59.18 <sup>a</sup>
α-ABA	16.12 ± 5.30 <sup>a</sup>	16.89 ± 3.32 <sup>a</sup>	15.43 ± 4.36 <sup>a</sup>
Cit	13.30 ± 21.13 <sup>a</sup>	1.83 ± 0.21 <sup>a</sup>	2.98 ± 1.55 <sup>a</sup>
Val	119.36 ± 40.01 <sup>b</sup>	407.71 ± 50.03 <sup>a</sup>	70.43 ± 14.30 <sup>c</sup>
Cys	30.77 ± 7.73 <sup>b</sup>	149.19 ± 59.09 <sup>a</sup>	11.68 ± 4.36 <sup>c</sup>
Met	8.83 ± 6.16 <sup>b</sup>	186.29 ± 124.97 <sup>a</sup>	2.12 ± 0.97 <sup>b</sup>
Ile	109.19 ± 38.20 <sup>b</sup>	332.75 ± 119.60 <sup>a</sup>	26.57 ± 10.82 <sup>c</sup>
Leu	75.26 ± 15.68 <sup>b</sup>	265.38 ± 106.85 <sup>a</sup>	52.39 ± 44.52 <sup>b</sup>
Tyr	101.43 ± 10.93 <sup>b</sup>	436.84 ± 85.76 <sup>a</sup>	1.44 ± 2.50 <sup>c</sup>
Phe	288.87 ± 21.82 <sup>b</sup>	649.26 ± 82.15 <sup>a</sup>	39.96 ± 9.77 <sup>c</sup>
β-Ala	12.81 ± 0.12 <sup>b</sup>	50.83 ± 11.37 <sup>a</sup>	13.4 ± 5.38 <sup>b</sup>
β-ABA	4.54 ± 1.27 <sup>a</sup>	20.74 ± 19.62 <sup>a</sup>	20.49 ± 18.33 <sup>a</sup>
GABA	22.36 ± 3.61 <sup>b</sup>	120.67 ± 28.39 <sup>a</sup>	4.96 ± 0.82 <sup>c</sup>
His	47.98 ± 67.60 <sup>a</sup>	112.74 ± 91.91 <sup>a</sup>	7.65 ± 6.45 <sup>a</sup>
1Mehis	2.60 ± 0.92 <sup>a</sup>	2.25 ± 1.73 <sup>a</sup>	1.56 ± 0.72 <sup>a</sup>
Trp	198.88 ± 143.53 <sup>a</sup>	291.67 ± 27.86 <sup>ab</sup>	107.82 ± 122.81 <sup>a</sup>
ORN	269.81 ± 221.78 <sup>ab</sup>	511.05 ± 136.14 <sup>a</sup>	92.56 ± 101.36 <sup>b</sup>
Lys	149.50 ± 69.70 <sup>b</sup>	323.17 ± 30.37 <sup>a</sup>	50.30 ± 54.02 <sup>b</sup>
Arg	75.01 ± 41.28 <sup>b</sup>	154.52 ± 34.90 <sup>a</sup>	22.34 ± 26.52 <sup>b</sup>

Data are expressed as mean ± S.D. (n=3). P-Ser, Phosphoserine. PEA, Phosphorylethanolamine. Asp, Aspartic acid. Thr, Threonine. Ser, Serine. Asn, Asparagine. Glu, Glutamate. Thea, Theanine. α-AAA, α-amino acetic

acid. Gly, Glycine. Ala, Alanine.  $\alpha$ -ABA,  $\alpha$ -Aminobutyric acid. Cit, Citrulline. Val, Valine. Cys, Cystine. Met, Methionine. Ile, Isoleucine. Leu, Leucine. Tyr, Tyrosine. Phe, Phenylalanine.  $\beta$ -Ala,  $\beta$ -Alanine.  $\beta$ -ABA,  $\beta$ -Aminobutyric acid. GABA,  $\gamma$ -Aminobutyric acid. His, Histidine. 1Mehis, 1-Methyl histidine. Trp, Tryptophan. ORN, Ornithine. Lys, lysine. Arg, Arginine. Different means with different letters in the same row are significantly different from each other ( $p \leq 0.05$ ).





**Figure S1.** GC-MS chromatograms of aroma compound in tea leaves during black tea manufacturing process.