Supplementary Table 1 Subcellular metabolite distributions in wild type and invertase expressing tubers

Compound	Wild type			U-IN2-30			U-IN1-33		
	Plastid	Cytosol	Vacuole	Plastid	Cytosol	Vacuole	Plastid	Cytosol	Vacuole
Fructose	16.0 ± 4.8	2.8 ± 2.8	81.2 ± 4.9	5.5 ± 2.9	11.5 ± 4.0	83.0 ± 1.5	21.8 ± 4.9	3.0 ± 2.6	75.3 ± 4.2
Glucose	5.2 ± 3.2	21.2 ± 7.4	73.6 ± 6.3	9.8 ± 4.6	45.0 ± 9.8	**45.3 ± 5.6**	19.3 ± 8.1	21.5 ± 8.9	59.3 ± 7.6
Mannose	3.0 ± 1.9	1.0 ± 0.6	96.0 ± 2.5	3.3 ± 1.6	4.5 ± 2.3	93.0 ± 2.7	1.3 ± 0.6	1.8 ± 1.5	97.0 ± 1.3
Isomaltose				6.0 ± 4.9	29.8 ± 12.6	64.3 ± 9.7			
Trehalose				14.5 ± 9.8	75.0 ± 9.9	9.5 ± 5.7			
Maltose				28.0 ± 9.1	**71.3 ± 9.6**	**0.8 ± 0.6**			
Sucrose	4.2 ± 2.5	13.8 ± 3.2	82.0 ± 3.3	33.8 ± 16.9	39.5 ± 19.6	**26.8 ± 9.7**	**31.8 ± 5.9**	**56.3 ± 3.5**	**12.0 ± 4.0**
Inositol	16.4 ± 4.9	13.2 ± 3.0	70.4 ± 3.3	16.5 ± 4.0	**51.0 ± 6.9**	**32.5 ± 5.4**	27.0 ± 4.6	11.3 ± 4.7	61.8 ± 2.5
Maltitol				25.3 ± 13.8	44.5 ± 18.6	30.3 ± 18.2			
Mannitol	17.6 ± 4.6	22.0 ± 7.9	60.0 ± 5.3	20.3 ± 11.2	35.8 ± 12.8	**44.0 ± 2.4**	30.0 ± 5.6	6.5 ± 3.4	63.5 ± 3.3
Fru-6-P	41.6 ± 13.5	54.8 ± 12.4	1.6 ± 1.6	**4.3 ± 3.7**	**95.8 ± 3.7**	0.0 ± 0.0	44.3 ± 18.5	48.7 ± 20.7	7.0 ± 2.9
Glu-6-P	42.0 ± 13.5	54.6 ± 12.7	3.4 ± 2.1	13.0 ± 6.8	87.0 ± 6.8	0.0 ± 0.0	50.3 ± 16.0	46.3 ± 16.6	3.5 ± 3.0
3-P-glycerate	30.0 ; 28.0	61.0 ; 72.0	9.0 ; 0.0	12.5 ± 7.8	87.5 ± 7.8	0.0 ± 0.0	35.5 ± 10.9	58.8 ± 13.5	5.8 ± 3.2
Sorbitol-6-P	30.0 ; 28.0	61.0 ; 72.0	9.0 ; 0.0	12.5 ± 7.8	87.5 ± 7.8	0.0 ± 0.0	35.5 ± 10.9	58.8 ± 13.5	5.8 ± 3.2
Ascorbate	67.0 ; 58.0	0.0 ; 42.0	28.0 ; 0.0	72.3 ± 6.7	0.0 ± 0.0	27.8 ± 6.7	57.3 ± 13.7	4.3 ± 3.1	38.3 ± 14.4
Citrate	1.0 ± 1.0	13.2 ± 8.1	85.8 ± 7.7	3.3 ± 1.6	4.5 ± 2.3	93.0 ± 2.7	1.3 ± 0.6	1.8 ± 1.5	97.0 ± 1.3
Fumarate	3.4 ± 1.8	7.0 ± 3.8	89.6 ± 3.3	5.0 ± 2.7	**23.8 ± 4.9**	**71.3 ± 2.4**	3.8 ± 2.1	16.8 ± 6.6	79.5 ± 5.4
Glycerate	0.0 ; 35.0	94.0 ; 27.0	6.0 ; 38.0	13.8 ± 5.2	26.8 ± 6.7	59.5 ± 3.4	18.3 ± 6.2	20.3 ± 10.0	61.5 ± 5.5
Isocitrate	3.0 ± 1.9	1.0 ± 0.6	96.0 ± 2.5	3.3 ± 1.6	4.5 ± 2.3	93.0 ± 2.7	1.3 ± 0.6	1.8 ± 1.5	97.0 ± 1.3
α-Ketoglutarate	22.0 ; 25.0	48.0 ; 51.0	30.0 ; 24.0	23.3 ± 9.8	52.3 ± 13.3	24.5 ± 4.3	41.0 ± 13.9	30.0 ± 10.8	29.0 ± 3.4
Malate	3.0 ± 1.9	1.0 ± 0.6	96.0 ± 2.5	3.3 ± 1.6	4.5 ± 2.3	93.0 ± 2.7	1.3 ± 0.6	1.8 ± 1.5	97.0 ± 1.3
Oxalate	3.0 ; 5.0	23.0 ; 0.0	74.0 ; 95.0	0.0 ± 0.0	16.3 ± 5.6	83.8 ± 5.6	2.3 ± 1.9	9.3 ± 4.9	88.5 ± 4.2
Quinate	4.0 ± 1.8	2.6 ± 0.7	93.4 ± 2.0	5.8 ± 2.9	1.5 ± 0.8	92.8 ± 2.7	6.5 ± 1.3	2.8 ± 2.4	90.8 ± 2.3
Shikimate	16.4 ± 5.5	19.8 ± 8.3	63.8 ± 4.5	16.0 ± 6.0	15.3 ± 3.5	68.8 ± 4.1	30.0 ± 14.2	23.0 ± 6.0	47.0 ± 8.5
Succinate	13.2 ± 6.4	12.4 ± 5.1	74.4 ± 6.7	13.0 ± 5.2	**53.3 ± 5.4**	**33.8 ± 2.1**	11.8 ± 2.9	9.3 ± 4.9	79.0 ± 2.1

Developing tuber samples were taken from 10-week-old plants grown in 2 L pots in the greenhouse. The tissue was fractionated using a non-aqueous procedure. Metabolites in each fraction were measured in methanol extracts using GC-MS. The subcellular distributions were calculated by comparing the metabolite and marker enzyme distributions using a three-compartment calculation program. Results represent the means ± SE of measurements on 3-5 different fractionations from different tuber samples, or the single meassurements of two fractionations. Numbers in bold represent subcellular distributions statistically different from the wild-type ($p < 0.05$). Underlined numbers represent subcellular distributions statistically different between U-IN1-33 and U-IN2-30 ($p<0.05$).

Supplementary Table 2 Subcellular amino acid distributions in wild type and invertase-expressing tubers

Compound	Wild type			U-IN2-30			U-IN1-33		
	Plastid	Cytosol	Vacuole	Plastid	Cytosol	Vacuole	Plastid	Cytosol	Vacuole
Alanine	5.0 ± 3.3	18.4 ± 7.4	76.6 ± 9.0	31.3 ± 11.8	14.0 ± 6.8	54.8 ± 7.0	**32.5 ± 6.9**	10.8 ± 9.3	56.8 ± 6.3
b-Alanine	1.0 ; 0.0	14.0 ; 18.0	85.0 ; 82.0	14.3 ± 4.4	8.0 ± 5.3	77.8 ± 2.2	16.0 ± 3.4	4.3 ± 3.7	79.8 ± 2.9
Arginine	8.8 ± 8.8	12.2 ± 3.7	79.0 ± 9.9	17.3 ± 5.7	6.8 ± 5.6	76.0 ± 2.7	15.0 ± 5.0	3.0 ± 2.6	82.0 ± 4.9
Asparagine	29.0 ± 4.3	6.2 ± 2.9	64.8 ± 5.3	23.0 ± 4.4	15.0 ± 8.3	62.0 ± 5.3	28.8 ± 3.9	3.8 ± 3.2	67.5 ± 2.0
Aspartate	50.6 ± 12.8	28.2 ± 10.8	21.2 ± 6.3	22.5 ± 11.2	44.3 ± 14.0	33.3 ± 7.5	41.0 ± 8.2	22.8 ± 7.5	36.3 ± 1.7
Cysteine	0.0 ; 12.0	25.0 ; 14.0	75.0 ; 74.0	16.8 ± 6.4	6.5 ± 5.6	76.8 ± 4.3	23.0 ± 7.6	8.5 ± 7.4	68.5 ± 3.8
GABA	0.0 ; 0.0	14.0 ; 7.0	86.0 ; 93.0	11.5 ± 3.0	5.0 ± 3.3	83.5 ± 1.7	11.3 ± 3.9	4.0 ± 3.5	84.8 ± 3.5
Glutamate	38.2 ± 7.8	39.6 ± 10.0	22.2 ± 5.9	22.8 ± 11.2	52.5 ± 15.0	24.8 ± 5.3	42.3 ± 7.2	37.0 ± 6.2	20.8 ± 2.0
Glutamine	19.6 ± 3.9	10.6 ± 4.1	69.8 ± 5.2	27.8 ± 9.6	9.5 ± 8.2	62.8 ± 5.3	17.5 ± 5.6	9.8 ± 4.4	72.8 ± 2.3
Glycine	14.0 ± 6.0	12.0 ± 2.7	74.0 ± 5.1	23.8 ± 6.2	11.5 ± 5.8	64.8 ± 2.5	24.5 ± 4.5	6.8 ± 5.0	68.8 ± 1.5
Histidine	8.0 ; 0.0	1.0 ; 0.0	91.0 ; 100.0	13.0 ± 4.6	0.0 ± 0.0	87.0 ± 4.6	12.0 ± 4.7	0.0 ± 0.0	88.0 ± 4.7
Homoserine	20.6 ± 6.6	6.4 ± 3.4	73.0 ± 4.0	28.5 ± 9.1	16.8 ± 8.4	**54.8 ± 1.6**	15.0 ± 11.9	37.5 ± 14.8	**47.5 ± 9.4**
Isoleucine	7.6 ± 4.7	18.4 ± 6.0	74.0 ± 6.7	23.8 ± 9.5	8.3 ± 4.2	68.0 ± 5.7	**36.0 ± 8.0**	8.5 ± 7.1	55.5 ± 6.5
Leucine	7.2 ± 4.8	31.8 ± 4.6	61.0 ± 6.5	25.0 ± 10.0	14.3 ± 7.2	60.8 ± 3.4	**36.3 ± 10.8**	15.0 ± 9.2	48.8 ± 7.7
Lysine	5.2 ± 1.8	4.8 ± 2.0	90.0 ± 2.8	30.5 ± 11.6	19.0 ± 10.1	**50.5 ± 1.9**	**34.8 ± 5.8**	11.5 ± 6.0	**53.8 ± 3.2**
Methionine	11.2 ± 2.0	5.2 ± 2.2	83.6 ± 1.7	23.0 ± 6.3	6.5 ± 4.3	**70.5 ± 3.4**	**28.3 ± 5.8**	5.3 ± 4.5	**66.5 ± 4.9**
Phenylalanine	19.8 ± 3.8	18.0 ± 5.5	62.2 ± 4.4	25.0 ± 7.2	14.5 ± 7.7	60.5 ± 2.0	**38.8 ± 5.2**	8.8 ± 7.6	52.5 ± 2.7
Ornithine	14.6 ± 6.4	4.4 ± 3.2	81.0 ± 7.8	22.8 ± 5.9	10.5 ± 4.5	66.8 ± 2.3	27.0 ± 6.3	5.8 ± 3.9	67.3 ± 4.3
5-Oxoproline	4.0 ; 12.0	43.0 ; 32.0	53.0 ; 56.0	27.8 ± 12.6	39.5 ± 18.6	32.8 ± 7.7	16.0 ± 5.1	21.5 ± 2.1	62.5 ± 3.3
Proline	8.4 ± 5.2	26.4 ± 9.2	65.2 ± 10.8	16.0 ± 8.3	27.0 ± 21.1	57.0 ± 17.3	35.5 ± 11.4	7.0 ± 3.8	57.5 ± 8.2
Serine	13.2 ± 6.4	19.6 ± 6.9	67.2 ± 4.5	20.0 ± 9.6	24.3 ± 8.6	55.8 ± 4.5	37.3 ± 9.8	9.5 ± 7.4	53.3 ± 4.9
Threonine	13.6 ± 6.2	11.8 ± 2.7	74.6 ± 5.4	17.5 ± 7.7	11.0 ± 5.9	69.8 ± 4.0	29.3 ± 6.8	5.5 ± 4.8	66.8 ± 5.6
Tryptophane	29.0 ± 12.3	7.4 ± 5.3	63.6 ± 11.3	10.8 ± 5.4	0.0 ± 0.0	89.3 ± 5.4	38.8 ± 6.0	8.5 ± 7.4	52.8 ± 6.7
Tyrosine	21.2 ± 2.7	8.4 ± 4.5	70.4 ± 6.2	22.3 ± 6.2	16.8 ± 8.5	61.0 ± 3.8	**37.3 ± 5.8**	10.0 ± 8.1	52.5 ± 6.2
Valine	5.2 ± 3.1	20.6 ± 5.7	74.2 ± 6.7	25.3 ± 10.3	7.8 ± 4.1	67.0 ± 6.9	**31.0 ± 4.9**	7.3 ± 6.3	61.8 ± 5.6

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