Table S1. Rapidly digestible starch (RDS) % in potato lines from a Plant & Food Research germplasm collection

Line / 'Cultivar'	Mean RDS% [a]	SD[b]
Low RDS (≤ 55)		
4266.2	46	6
Crop39	51	6
Crop71	53	9
Crop20	54	4
Crop56	55	9
4652.5	55	11
Crop85	55	7
Medium RDS (56 –70)		
'Yukon Gold'	56	8
'Innovator'	56	6
'Appasionata'	57	7
4477.2	57	7
'Tiffany'	58	9
'Ranger Russet'	59	4
'Frisia'	59	9
Crop15 ('Golden Miracle')	60	8
1446/1	60	7
'Kaimai'	61	8
4203.2	62	8
'Pink Fir Apple'	62	10
'Western Russet'	62	7
'Mona Lisa'	62	7
'Fraser'	62	10
'Mayan Gold'	64	6
Crop41	65	7
'Ramos'	65	8
L118-2	66	7
V99	66	8
'Red Rascal'	67	3
High RDS (≥ 70)		
810/7	70	5
Crop58	72	4
'Spirit'	72	8
'Fianna'	73	5
4652.3	73	9
'Karaka'	74	3
VTN	74	6
'Laura'	74	5
VR808	74	3
Crop35	75	4
'Desiree'	75	7
Crop28	76	7
'Gladiator'	76	9
Crop23	76	7
L115-1	76	2
'Romance'	76	4
Crop9	76	4
Crop62	76	8
4374.7	76	8
'Crystal'	76	6
'Nadine'	76	1
V394	77	7
DTO-28	77	4
Crop66	77	10
'Heather'	77	9
Crop78	77	2
'Ladies Fingers'	77	3
4607.7	77	7
'Melody'	78	7
'Rua'	78	5
Crop64	78	4
940/5	78	8
4546.3	78	7
427/13	79	5
Crop40	79	7
'Glenna'	79	5
'Moe Moe'	79	8
'Dolce Vita'	79	1
'Kiwitea'	79	2
'Lone Ranger'	80	4
'Driver'	80	2
V390	80	7
1335/8	80	5
121/2	80	4
'Annabelle'	80	4
'Lady Claire'	81	10
1287/12	81	3
Crop55	81	3
'Mondial'	81	3
'Tutaekuri'	81	4
'Lady Jo'	82	4
060/1	85	5
'Kowiniwini'	85	5
Crop33 ('Purple Heart')	85	2
Crop22	86	7
'Summer Delight'	86	4
'Atlantic'	86	1
'Haukaroro'	86	1
2000A	88	6
'Bison'	91	9
'Norvalley'	91	4
Crop32 ('Purple Passion')	92	3
'Markies'	93	3
'Moonlight'	94	8
'Albatros'	95	3
'Agria'	98	9
Crop19 ('Bondi')	99	7
Crop34 ('Satin King™')	103	6

[a] Rapidly digestible starch (20 min) as a percentage of total available starch (120 min) measured by *in vitro* digestion (Englyst method)

[b] Standard deviation (SD) of three *in vitro* digestion replicates with duplicate glucose (DNS method) quantification assays

Table S2. Average tuber weight (g), dry matter concentration (mg g^{-1}) and total starch contents in raw and cooked tubers (% dry weight) of 20 potato lines analyzed

Line / 'Cultivar'	Average tuber weight (g)	Dry matter concentration (mg g^{-1})	Total starch content in raw tubers[a] (% dry weight)	Total starch content in cooked tubers[a] (% dry weight)
4266.2	144	223.2	72.8	54.0
Crop39	205	201.4	65.5	63.5
Crop71	172	262.2	73.0	66.4
Crop20	169	243.8	71.6	63.8
Crop56	195	203.6	65.3	60.4
4652.5	194	257.2	81.2	75.3
Crop85	135	246.7	70.1	62.5
'Innovator'	199	230.4	79.8	81.8
'Appasionata'	180	217.3	74.6	62.6
'Yukon Gold'	91	179.5	63.1	58.1
'Haukaroro'	105	293.2	70.2	66.4
2000A	132	193.6	67.3	58.3
'Norvalley'	185	217.9	67.5	65.9
'Markies'	168	232.7	73.2	68.0
'Albatros'	195	176.7	61.0	52.2
Crop34	126	228.2	74.0	71.7
Crop32	119	208.2	63.3	56.0
'Moonlight'	179	207.9	68.4	54.3
Crop19	314	232.2	70.9	61.9
'Agria'	187	239.8	65.7	59.5

[a] Megazyme Total Starch Assay Kit (AA/AMG K-TSTA 09/14, Megazyme International, Ireland).

Comparison of starch content in raw and cooked tubers showed that, with the exception of line 4266.2, the method of cooking employed (potato slices tightly wrapped in aluminum foil placed in a boiling water bath) did not result in substantially different losses of starch between the lines due to leaching into the cooking medium.

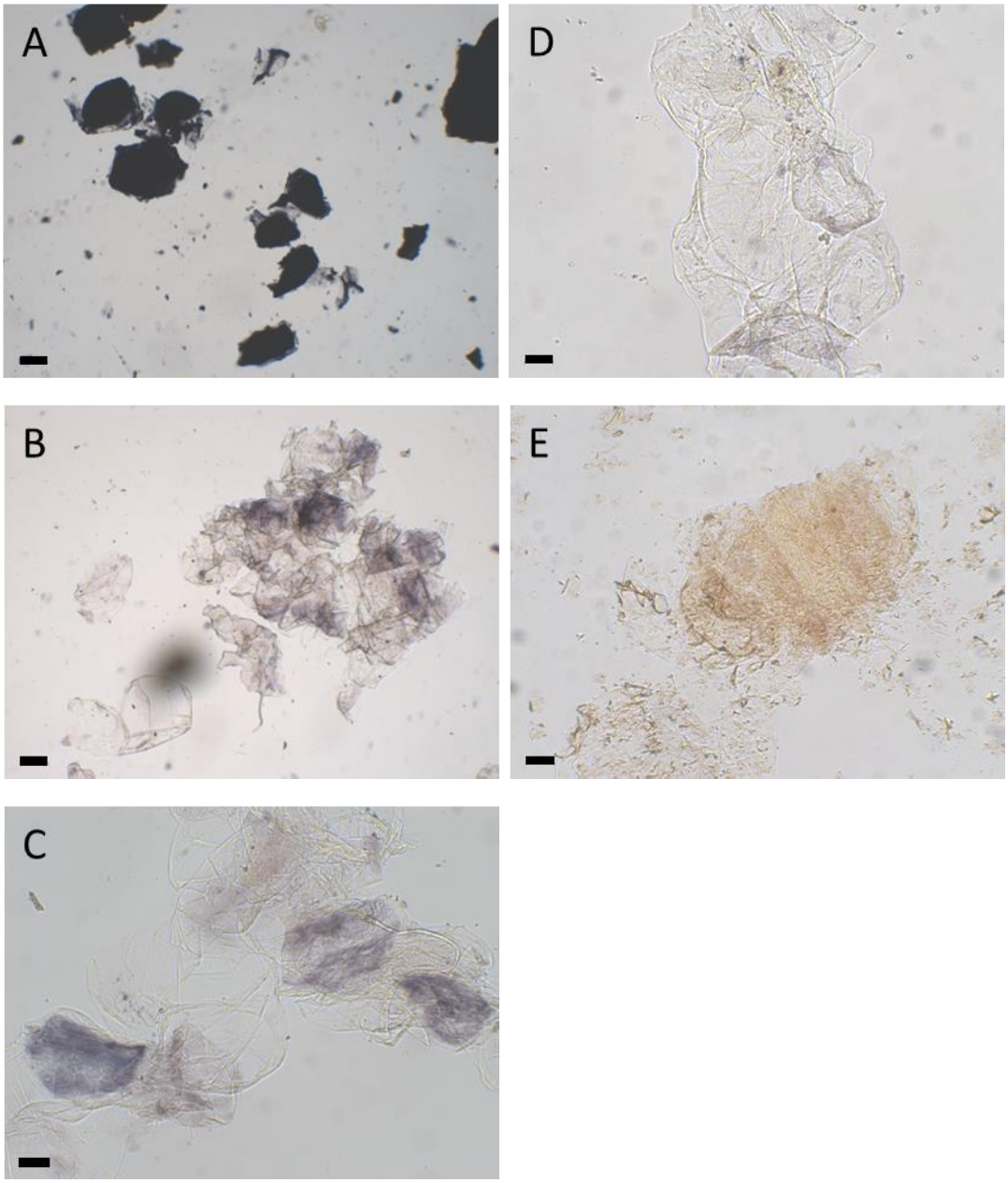

Fig. S1 Detection of starch by staining with KI/I_2 and light microscopy during de-starching procedure of cell wall material isolation. Presence of starch in dark purple prior α-amylase treatment (A), after Day 1 treatment (B), after Day 2 treatment (C), after Day 3 treatment (D) and negative test for starch (E). Bar = 100 µm. Images are from cultivar 'Moonlight' and are representative of all lines tested.

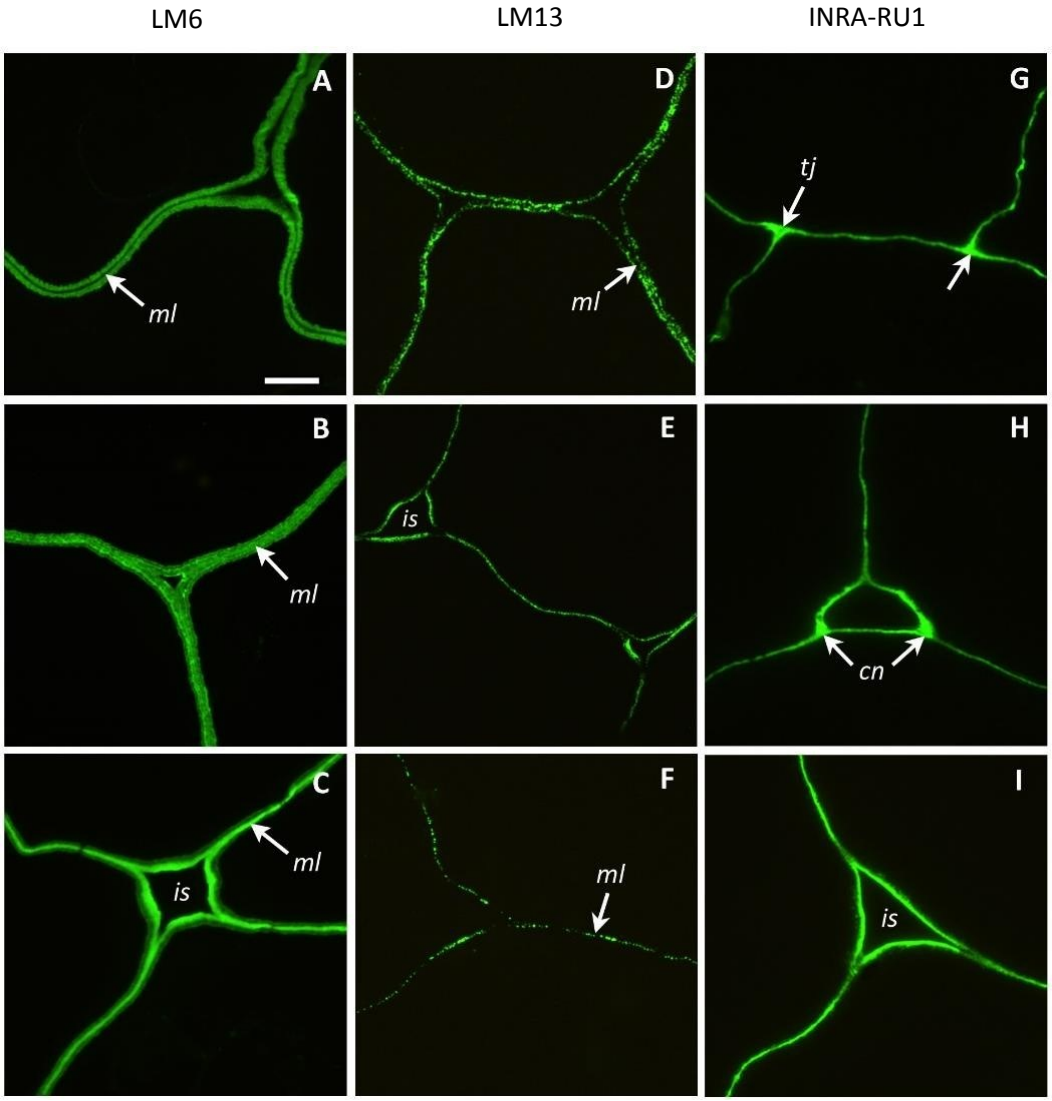

Fig. S2 Immunofluorescence labeling of potato tuber sections with monoclonal antibodies LM6 ((1→5)-α-L-arabinan) (A–C), LM13 (long unbranched arabinans) (D–F) and INRA-RU1 (RG-I backbone) (G–I). Crop20 (A,D,G), Crop85 (B,E,H) and 'Agria' (C,F,I) represent all of the patterns observed. Bar in A = 10 µm. *ml*, middle lamella; *is*, intercellular space; *tj*, tricellular junction zone; *cn*, cell corner.

Labeling with LM6 ((1→5)-α-L-arabinan) (Fig. S2 A–C), LM13 (longer unbranched arabinans) (Fig. S2 D–F) and INRA-RU1 (RG-I backbone) (Fig. S2 G–I) showed three labeling patterns for each of the antibodies tested. LM6 labeling was present only in the primary wall and completely absent in the middle lamella of Crop19 and Crop20 (Fig. S2 A); appeared as intense labeling in both the primary wall and middle lamella in Crop39, Crop71, Crop85 and 'Moonlight' (Fig. S2 B); or weak labeling in the primary wall but very intense labeling in the middle lamella and regions facing intercellular spaces in 'Agria' and 2000A (Fig. S2 C).

Longer unbranched arabinans were less abundant, as shown by the fainter labeling with LM13 (Fig. S2 D–F). Crop19, Crop20, Crop39 and Crop71 showed punctated labeling of LM13 along the primary wall and absence in the middle lamella (Fig. S2 D); Crop85 and 2000A showed labeling facing intercellular spaces (Fig. S2 E); while 'Agria' and 'Moonlight' showed the least labeling, being very sparse in regions of the middle lamella (Fig. S2 F).

INRA-RU1 intensely labeled tricellular junction zones in Crop20 (Fig. S2 G), while Crop85, 2000A and 'Moonlight' showed very intense labeling in cell corners (Fig. S2 H) and Crop39, Crop71, Crop19 and 'Agria' showed most intense labeling in the regions lining the intercellular spaces (Fig. S2 I).

No collective spatial distribution or localization patterns of any of these epitopes were detected for the low RDS% potato lines (Crop39, Crop71 and Crop85).

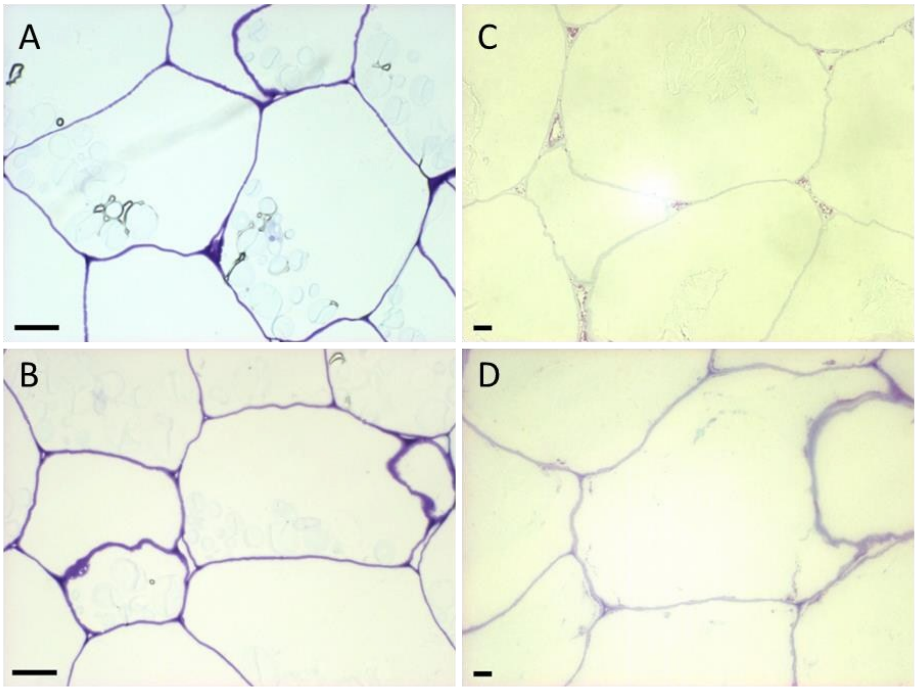

Fig. S3 Toluidine blue stained sections of raw (A, B) and cooked (C, D) potato lines 'Moonlight' (A, C) and Crop39 (B, D). Bar in images A and B = 50 µm; C and D = 10 µm. Toluidine blue stains cell walls a dark purple colour. Cell walls show some disintegration after cooking (C, D) as seen by the less intense purple staining.