Additional File 1. List of QTL identified using *Statistical Machine Learning* (SML), single *Marker Regression* (MR) and *Composite Interval Mapping* (CIM). The analyses were performed using the segregation data of the crude map (Additional File 2).

Trait	SML	MR	CIM >10cM
α-Amylase	1H (113.8), 2H (93.1), 3H (20.6), 5H (68.2, 94.4, 183.9), 7H (68.6, 96.4)	1H (96.3, 113.8), 2H (84.9), 3H (36.2), 4H (127.1), 5H (68.1, 135.4, 178.0), 6H (23.7), 7H (68.6, 137.3)	1H (126.4), 2H (84.9), 3H (8.9, 25.0, 115.3), 4H (127.1), 5H (65.7, 94.4, 182.8), 7H (68.6, 96.5)
Diastatic power	1H (1.5), 2H (134.4), 3H (38.5), 4H (1.1), 5H (80.8), 7H (67.0)	1H (1.5, 57.6, 108.1), 2H (83.7, 131.0), 3H (36.2, 78.9), 4H (1.1, 127.1), 5H (68.5), 6H (36.5, 77.2), 7H (67.0)	1H (1.8, 71.7), 2H (10.4, 35.2, 135.4), 3H (36.2, 112.1), 4H (1.1, 127.1), 5H (79.8, 140.4), 6H (80.4), 7H (61.5)
Malt extract	2H (133.2), 4H (86.6), 5H (179.1), 7H (68.6)	1H (1.5, 48.9), 2H (78.6, 93.1, 134.4), 3H (168.9), 4H (90.1), 5H (127.2, 177.2), 6H (23.7), 7H (68.6)	1H (1.7, 50.1, 132.0), 2H (4.2, 128.9), 3H (22.8), 4H (90.6, 145.7), 5H (99.3, 181.6), 7H (23.8, 70.1)
Heading date	2H (91.2, 117.8)	1H (1.1), 2H (71.9, 121.3), 7H (120.0)	1H (135.9), 2H (91.2, 121.3), 3H (86.6, 173.3), 4H (0.0, 85.5), 7H (107.7)
Plant height	2H (117.8), 3H (117.4), 5H (68.1)	1H (35.5, 91.1), 2H (14.8, 46.7, 118.9), 3H (117.4), 4H (142.2), 5H (71.5, 177.2), 6H (149.4), 7H (53.4)	2H (22.5, 91.2, 120.7), 3H (117.4), 4H (78.6, 92.6), 5H (68.1), 6H (144.1), 7H (52.8)
Lodging	2H (5.9, 95.1), 3H (115.3), 4H (34.1), 6H (60.6), 7H (46.6)	2H (15.5, 94.1), 3H (115.3), 4H (35.7, 51.7, 60.5, 142.2), 5H (48.3), 7H (77.6)	2H (5.2, 94.2, 112.5), 3H (16.3, 42.1, 117.4), 4H (39.6), 5H (13.0, 71.5), 6H (97.3), 7H (46.5, 89.0, 143.4)
Pubescent leaves	3H (38.5)	2H (82.7, 143.7), 3H (38.5), 4H (127.1), 5H (0, 10.8, 131.4)	3H (42.1)
Grain protein content	2H (3.8, 93.1), 3H (117.4, 158.4), 4H (34.1), 5H (46.5, 137.1)	2H (95.1), 3H (74.5, 115.3), 5H (37.6, 51.3, 125.6, 133.0), 6H (104.9)	2H (46.7, 94.2), 3H (78.9, 138.9, 160.1), 4H (41.6, 58.7), 5H (51.3, 84.2, 136.5), 7H (49.8, 118.7)
Yield	3H (115.3)	1H (113.8, 135.9), 2H (66.3), 3H (115.3), 4H (18.6, 42.7), 5H (1.1, 54.4, 156.8), 6H (9.8), 7H (22.5, 117.6)	3H (117.4), 4H (42.7), 5H (54.5, 93.6)