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Supplementary data

An integrated physical map of simple sequence repeats in bread wheat

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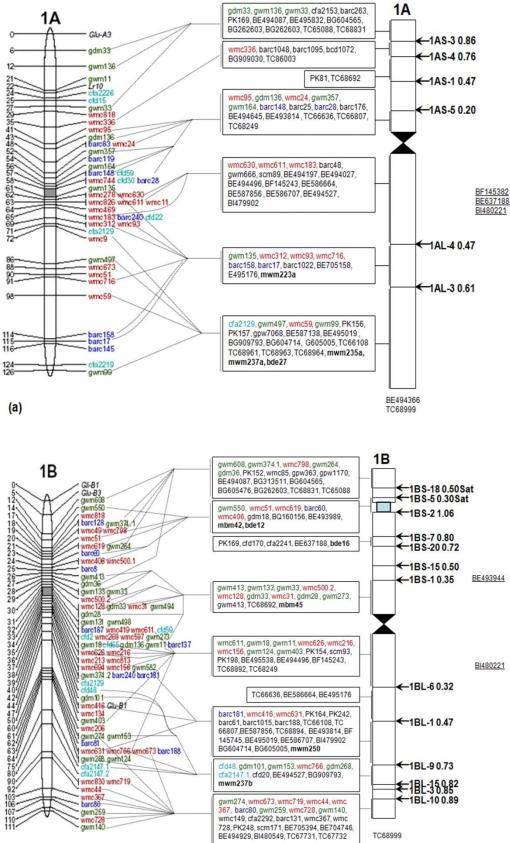
Supplementary Table 1. SSR loci showing perturbations	s in their map position between genetic and physical maps.
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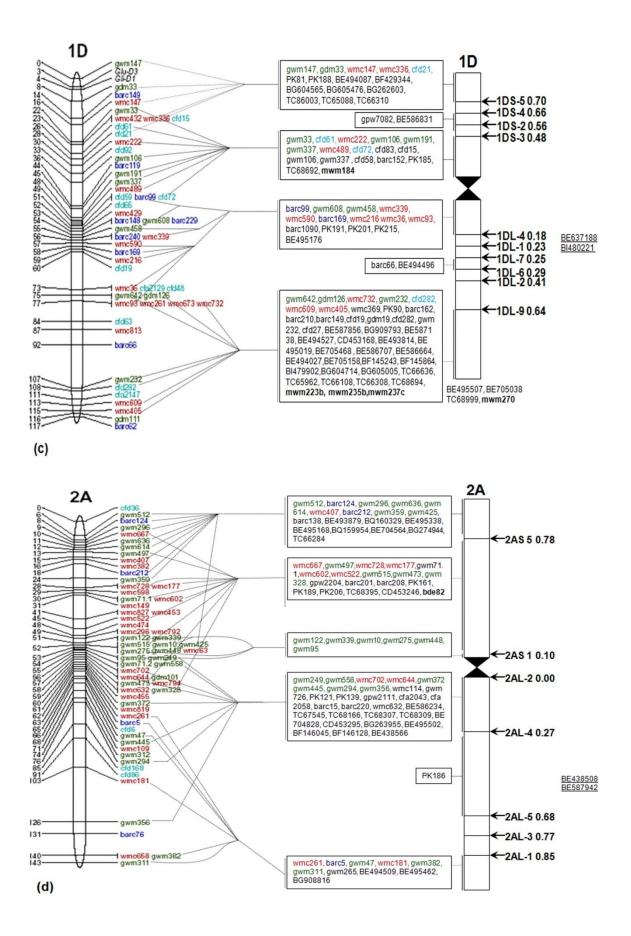
			Map position	
S. No.	SSR loci	Chromosome arms	Genetic map	Physical map
(i) Perturbe	d SSR loci mappe	d on same arm of individual		× • •
1.	gwm33	1AS	Interstitial	Distal
2.	gwm135	1AL	Centromeric	Interstitial
3.	gdm36	1BS	Centromeric	Distal
4.	gwm124	1BL	Interstitial	Centromeric
5.	gwm274	1BL	Interstitial	Distal
6.	wmc673	1BL	Interstitial	Distal
7.	wmc36	1DL	Interstitial	Centromeric
8.	wmc93	1DL	Interstitial	Centromeric
9.	gwm425	2AS	Centromeric	Distal
10.	gwm356	2AL	Distal	Centromeric
11.	wmc261	2AL	Centromeric	Distal
12.	barc5	2AL	Centromeric	Distal
13.	gwm47	2AL	Centromeric	Distal
13.	wmc257	2BS	Interstitial	Distal
15.	wmc474	2BS 2BS	Centromeric	Interstitial
15. 16.	wmc344	2BS 2BS	Centromeric	Interstitial
10.	wmc27	2BS 2BS	Centromeric	Interstitial
17.		2BS 2BS	Centromeric	Interstitial
18. 19.	gwm374 barc128	2BS 2BL	Centromeric	Distal
20.	gwm5	3AS	Centromeric	Distal
21.	gwm494	3AL	Interstitial	Distal
22.	gwm162	3AL	Interstitial	Distal
23.	wmc505	3BS	Centromeric	Distal
24.	barc68	3BS	Centromeric	Distal
25.	barc73	3BS	Centromeric	Interstitial
26.	wmc206	3BL	Interstitial	Centromeric
27.	barc77	3BL	Interstitial	Centromeric
28.	barc84	3BL	Interstitial	Distal
29.	wmc630	3DS	Distal	Centromeric
30.	cfd106	4DS	Centromeric	Distal
31.	barc196	6DS	Centromeric	Interstitial
32.	barc204	6DL	Interstitial	Centromeric
33.	barc175	6DL	Interstitial	Centromeric
34.	wmc168	7AS	Interstitial	Centromeric
35.	wmc525	7AL	Distal	Centromeric
36.	gwm46	7BS	Centromeric	Interstitial/Distal
37.	wmc606	7BS	Distal	Centromeric
38.	wmc311	7BL	Interstitial	Centromeric
39.	wmc435	7BL	Centromeric	Distal
40.	barc76	7DL	Distal	Centromeric
41.	gwm428	7DL	Distal	Interstitial
42.	wmc48	7DL	Centromeric	Interstitial
43.	wmc671	7DL	Interstitial	Distal
44.	barc111	7DL	Interstitial	Distal
		ferent arms of individual chro		Distai
1.	cfd72	1DS	1DL-Centromeric	1DS-Centromeric
1. 2.	gwm473	2AS	2AL-Centromeric	2AS-Centromeric
2. 3.	gwm328	2AS 2AS	2AL-Centromeric	2AS-Centromeric
3. 4.	gwm249	2AS 2AL	2AL-Centromeric	2AS-Centromeric 2AL-Centromeric
7.	gw111247	271	2A5-Centrollienc	2AL-CEIIU0IIIEIR

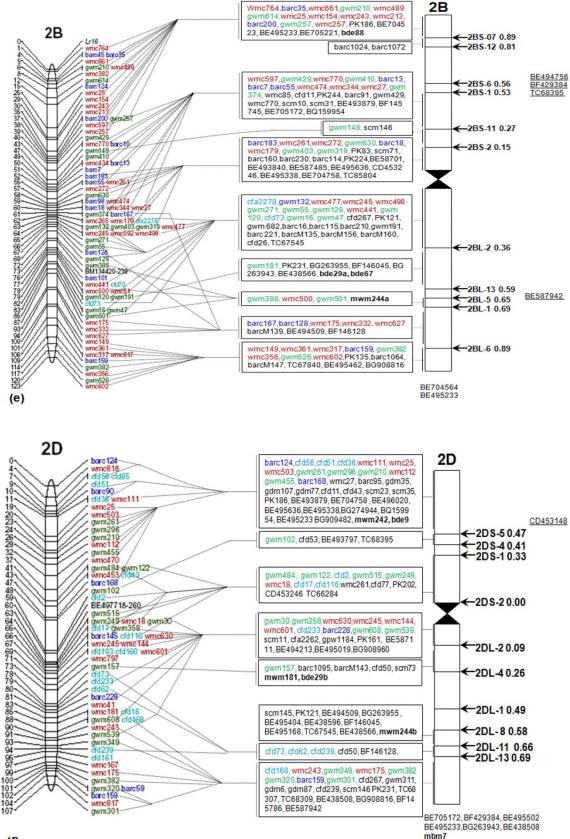
AJCS ISSN:1835-2707

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7.barcl 672BL2BS-Centromeric2BL-Distal8.cfd1172DS2DL-Centromeric2DS-Centromeric9.cfd1162DS2DL-Centromeric2DS-Centromeric10.barc673AS3AL-Centromeric3AS-Centromeric11.gnw6743AL3AS-Centromeric3BS-Centromeric12.gwm773BS3BL-Centromeric3BS-Centromeric13.gwm3763BL3BS-Centromeric3BS-Centromeric14.cfd23DS3DL-Centromeric3DS-Distal15.cfd703DS3DL-Centromeric3DS-Interstitial16.gwm3413DS3DL-Centromeric3DS-Centromeric18.gwm523DS3DL-Centromeric3DS-Centromeric19.gwm1913DS3DL-Centromeric3DS-Centromeric20.gwm643DL3DS-Centromeric3DS-Centromeric21.cfd714AS4AL-Distal4AS-Distal22.cfd714AS4BL-Interstitial4BS23.gwm3684BS4BL-Interstitial4BS24.barc1865AL5AS-Centromeric4DS-Distal25.gwm64BL4BS-Interstitial4BS26.cfd394BL4BS-Centromeric4DS-Distal27.barc984DS4DL-Centromeric5BL-Centromeric38.barc1865AL5AS-Centromeric5BL-Centromeric31.barc895BL5BS-Centromeric5BL-Centromeric </td <td></td> <td>U</td> <td></td> <td></td> <td></td>		U			
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10.barc673 AS3 AL-Centromeric3 AS-Centromeric11.gwm6743 AL3 AS-Centromeric3 AL-Centromeric12.gwm773 BS3 BL-Centromeric3 BS-Centromeric13.gwm3763 BL3 BS-Centromeric3 BS-Centromeric14.cfd23 DS3 DL-Centromeric3 DS-Distal15.cfd703 DS3 DL-Centromeric3 DS-Distal16.gwm3413 DS3 DL-Centromeric3 DS-Centromeric18.gwm4563 DS3 DL-Centromeric3 DS-Centromeric19.gwm1913 DS3 DL-Centromeric3 DS-Centromeric20.gwm6643 DL3 DS-Centromeric3 DL-Centromeric21.cfd24 AS4 AL-Distal4 AS-Distal22.cfd71 A AS4 AL-Centromeric4 AS-Centromeric23.gwm3684 BS4 BL-Interstitial4 BS24.barc204 BS4 BL-Interstitial4 BS25.gwm64 BL4 BS-Centromeric4 BL-Distal26.cfd394 BL4 BS-Centromeric4 BL-Distal27.barc984 DS4 DL-Centromeric5 BL-Centromeric28.barc1865 AL5 AS-Centromeric5 BL-Centromeric29.wmc4355 BS5 BL-Centromeric5 BL-Centromeric31.barc985 BL5 BS-Centromeric5 BL-Centromeric32.gwm675 BL5 BS-Centromeric5 BL-Centromeric33. <td< td=""><td></td><td></td><td></td><td></td><td></td></td<>					
11.gmw6743AL3AS-Centromeric3AL-Centromeric12.gvm773BS3BL-Centromeric3BS-Centromeric13.gvm3763BL3BS-Centromeric3BL-Centromeric14.cfd23DS3DL-Centromeric3DS-Distal15.cfd703DS3DL-Centromeric3DS-Distal16.gvm3413DS3DL-Centromeric3DS-Interstitial17.gvm523DS3DL-Centromeric3DS-Centromeric18.gvm4563DS3DL-Centromeric3DS-Centromeric19.gvm1913DS3DL-Centromeric3DS-Centromeric20.gvm6643DL3DS-Centromeric3DL-Centromeric21.cfd24AS4AL-Distal4AS-Distal22.cfd714AS4AL-Centromeric4AS-Centromeric23.gvm3684BS4BL-Interstitial4BS24.barc204BS4BS-Interstitial4BS25.gvm64BL4BS-Interstitial4BS26.cfd394BL4BS-Centromeric4DS-Distal27.barc984DS4DL-Centromeric5BL-Centromeric28.barc1865AL5AS-Centromeric5BL-Centromeric29.wmc4355BS5BL-Centromeric5BL-Centromeric31.barc45BL5BS-Centromeric5BL-Centromeric32.cfa20705BL5BS-Centromeric5BL-Centromeric33.barc45BL5BS-Centromeric5BL-Centromeric <td></td> <td></td> <td></td> <td></td> <td></td>					
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16. $gwm341$ 3DS3DL-Centromeric3DS-Interstitial17. $gwm52$ 3DS3DL-Centromeric3DS-Centromeric18. $gwm456$ 3DS3DL-Centromeric3DS-Centromeric19. $gwm191$ 3DS3DL-Centromeric3DL-Centromeric20. $gwm664$ 3DL3DS-Centromeric3DL-Centromeric21. $cfd2$ 4AS4AL-Distal4AS-Distal22. $cfd71$ 4AS4AL-Centromeric4AS-Centromeric23. $gwm368$ 4BS4BL-Interstitial4BS24. $barc20$ 4BS4BL-Interstitial4BS25. $gwm6$ 4BL4BS-Centromeric4DL-Distal26. $cfd39$ 4BL4BS-Centromeric4DL-Distal27. $barc98$ 4DS4DL-Centromeric5DS-Distal28. $barc186$ 5AL5AS-Centromeric5BL-Centromeric29. $wmc435$ 5BS5BL-Centromeric5BL-Centromeric31. $barc89$ 5BL5BS-Centromeric5BL-Centromeric33. $barc4$ 5BL5BS-Centromeric5BL-Interstitial34. $wmc805$ 5DS5DL-Centromeric5BL-Interstitial34. $wmc805$ 5DS5DL-Centromeric6BS-Interstitial37. $gwm361$ 6BS6BL-Centromeric6BS-Centromeric38. $gwm644$ 6BS6BL-Centromeric6BS-Centromeric39. $cfd287$ 6DL6DS-Centromeric6BS-Centromeric39. $cfd287$ <					
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21. $cfd2$ $4AS$ $4AL$ -Distal $4AS$ -Distal22. $cfd71$ $4AS$ $4AL$ -Centromeric $4AS$ -Centromeric23. $gwm368$ $4BS$ $4BL$ -Interstitial $4BS$ 24. $barc20$ $4BS$ $4BL$ -Interstitial $4BS$ 25. $gwm6$ $4BL$ $4BS$ -Interstitial $4BL$ -Distal26. $cfd39$ $4BL$ $4BS$ -Centromeric $4BL$ -Distal27. $barc98$ $4DS$ $4DL$ -Centromeric $4DS$ -Distal28. $barc186$ $5AL$ $5AS$ -Centromeric $5AL$ -Centromeric29. $wmc435$ $5BS$ $5BL$ -Centromeric $5BL$ -Centromeric30. $gwm67$ $5BL$ $5BS$ -Centromeric $5BL$ -Centromeric31. $barc89$ $5BL$ $5BS$ -Centromeric $5BL$ -Centromeric32. $cfa2070$ $5BL$ $5BS$ -Centromeric $5BL$ -Interstitial33. $barc4$ $5BL$ $5BS$ -Centromeric $5BL$ -Interstitial34. $wmc805$ $5DS$ $5DL$ -Centromeric $5DS$ -Centromeric35. $wmc786$ $6AS$ $6AL$ -Centromeric $6AS$ -Centromeric36. $barc198$ $6BS$ $6BL$ -Centromeric $6BS$ -Interstitial37. $gwm644$ $6BS$ $6BL$ -Centromeric $6BS$ -Centromeric38. $gwm644$ $6BS$ $6BL$ -Centromeric $6BS$ -Centromeric39. $cfd287$ $6DL$ $6DS$ -Centromeric $6DL$ -Interstitial40. $barc85$ $7BL$ $7BS$ -Centromeric $7BL$ -Centromeric		-			
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39.cfd2876DL6DS-Centromeric6DL-Interstitial40.barc857BL7BS-Centromeric7BL-Centromeric41.barc727BL7BS-Centromeric7BL-Centromeric42.cfd147DS7DL-Centromeric7DS-Centromeric	37.	gwm361	6BS	6BL-Centromeric	6BS-Centromeric
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41.barc727BL7BS-Centromeric7BL-Centromeric42.cfd147DS7DL-Centromeric7DS-Centromeric	39.	cfd287	6DL	6DS-Centromeric	6DL-Interstitial
42. cfd14 7DS 7DL-Centromeric 7DS-Centromeric	40.	barc85	7BL	7BS-Centromeric	7BL-Centromeric
	41.	barc72	7BL	7BS-Centromeric	7BL-Centromeric
43. gwm121 7DS 7DL-Centromeric 7DS-Centromeric	42.	cfd14	7DS		7DS-Centromeric
	43.	gwm121	7DS	7DL-Centromeric	7DS-Centromeric

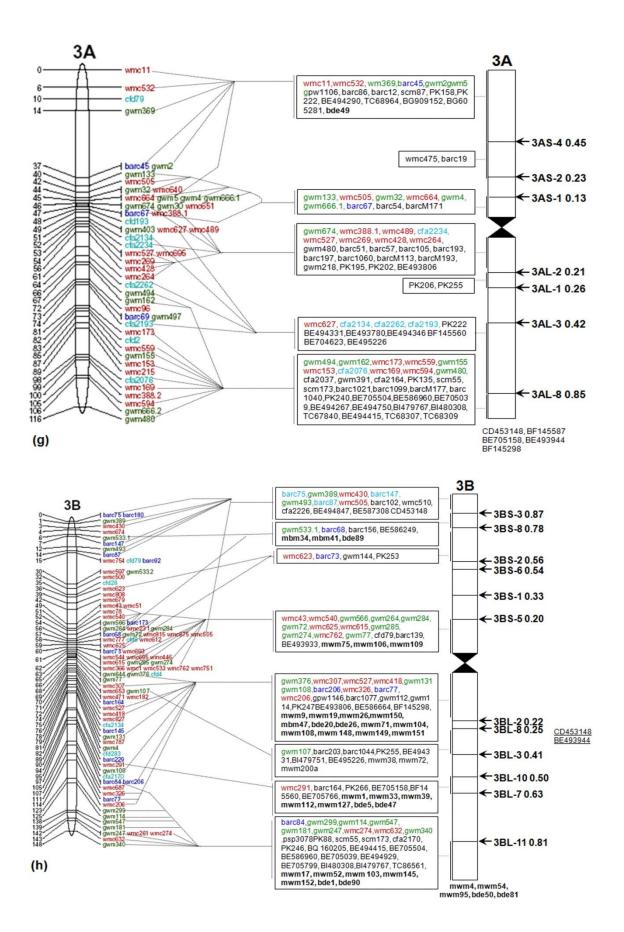
Supplementary Fig 1a-u. Integrated physical map of SSRs in bread wheat prepared using wet-lab approach (right hand side) and its comparison with available consensus genetic map (left hand side). Arrows and description on the right side of integrated physical map are deletion break points, deletion designation and fraction length; individual boxes on the left side contain markers mapped within individual bins covered by a vertical line; corresponding SSR loci in physical and genetic maps are connected by dotted lines. Markers in bold face (mwm, mbm and bde) are physically mapped in the present study.

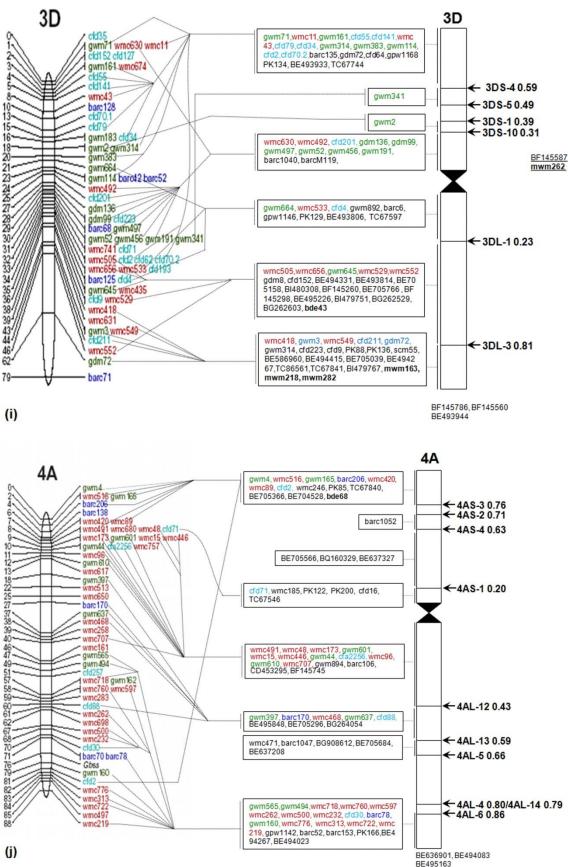


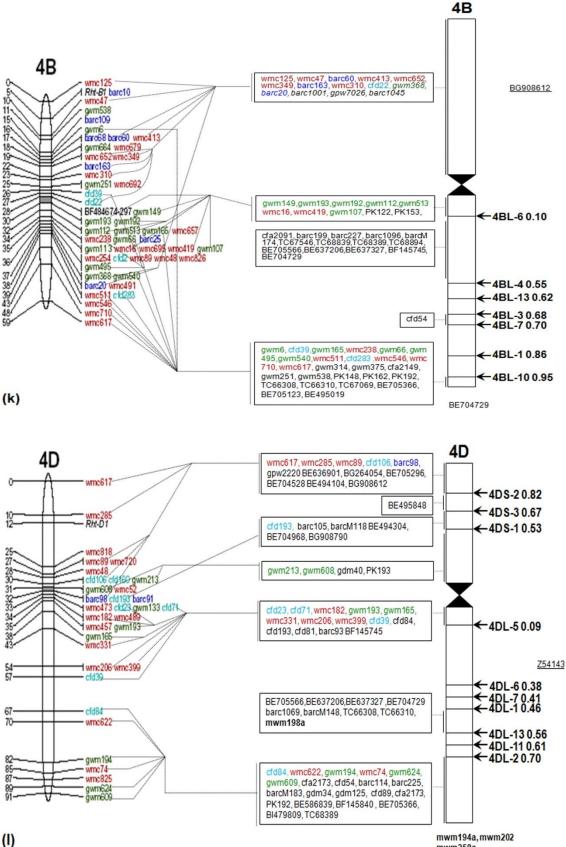




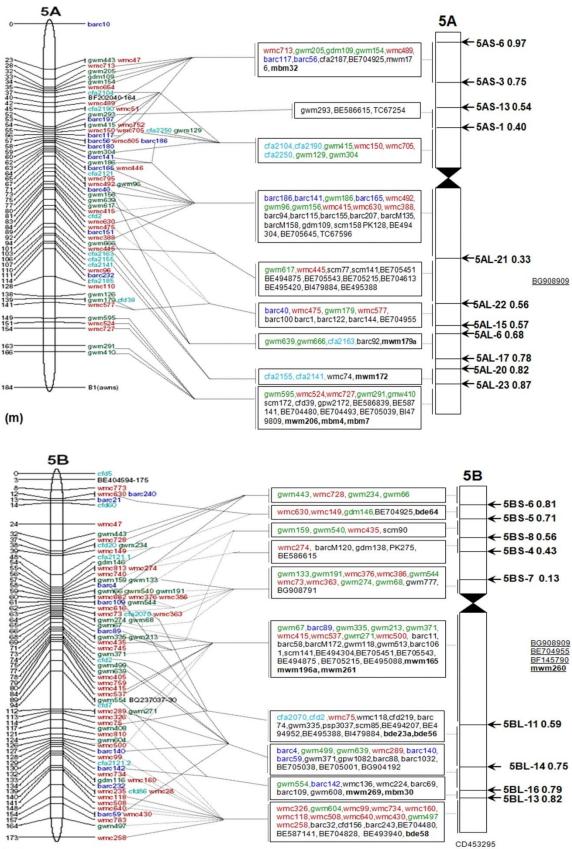
(f)



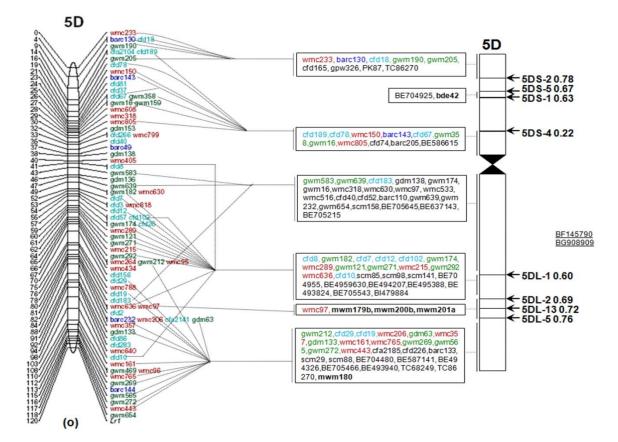


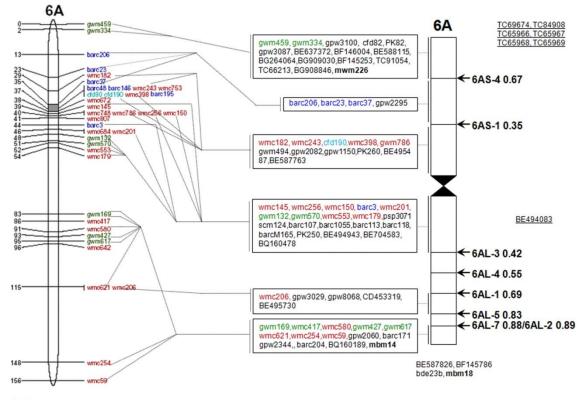


mwm258a

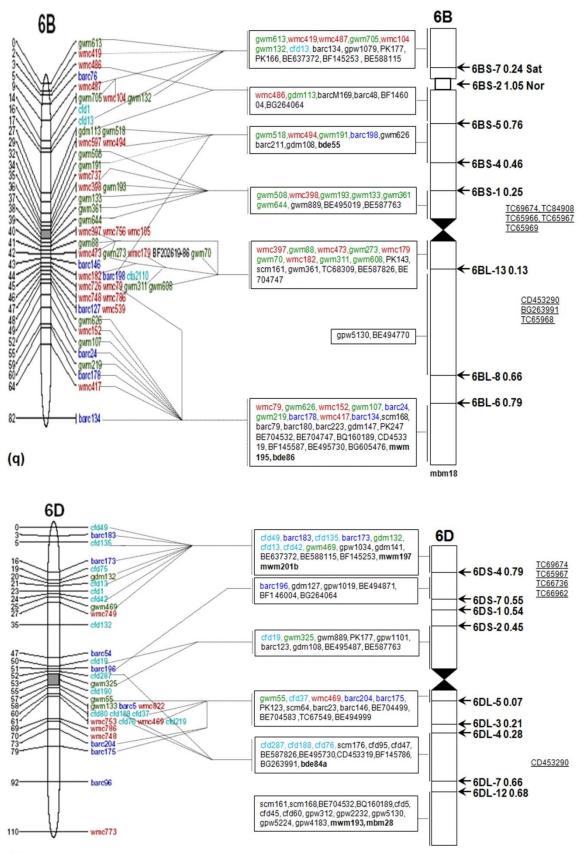


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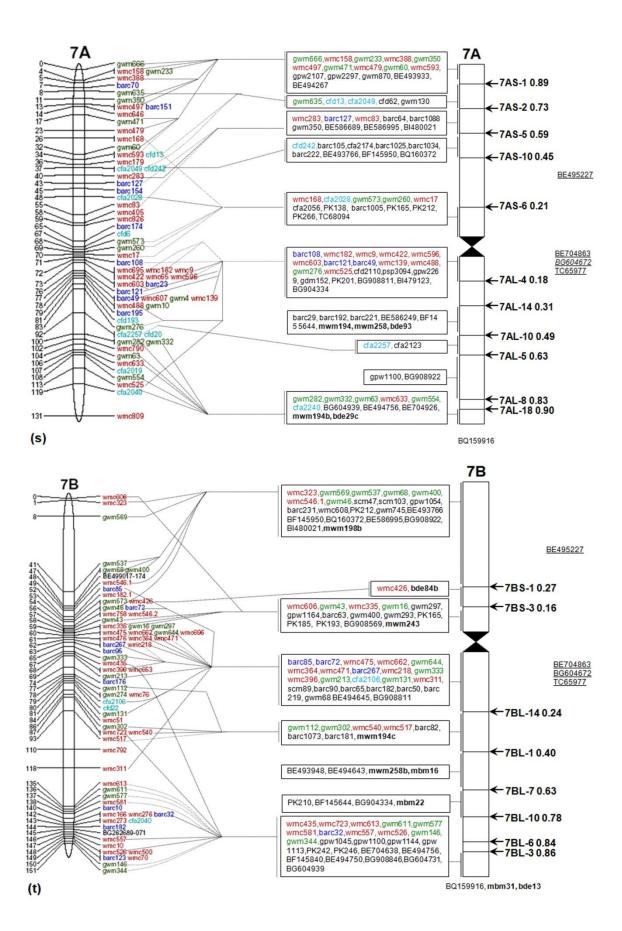


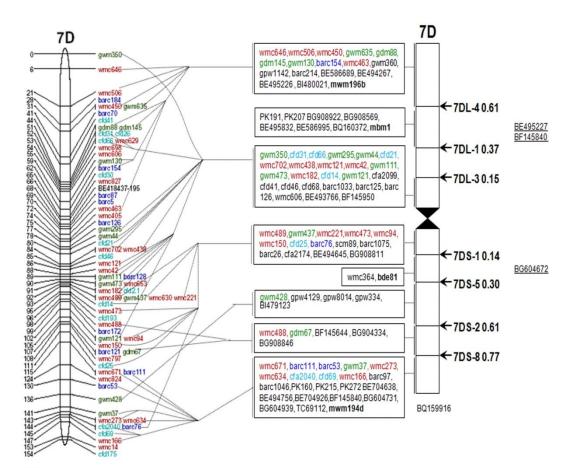


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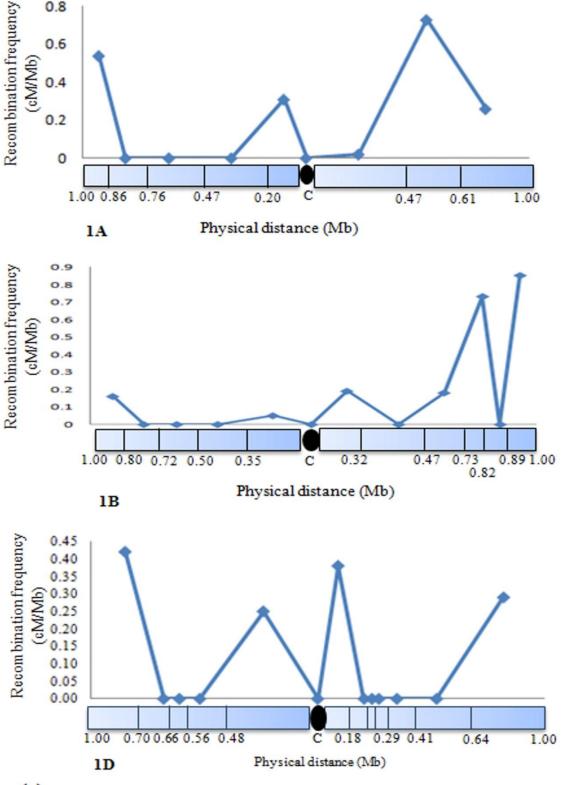








Supplementary Fig 2a-g. Graph plots showing physical distribution of recombination frequency (cM/Mb) along individual wheat chromosome. The frequency of recombination was calculated by dividing the length of a genetic sub-region in cM by the length of the corresponding physical sub-region (bin) in Mb and was plotted at the midpoint of each physical sub-region or bin. The oval shaped black dot indicates physical position of the centromere, which is also represented by 'C'. Vertical lines on the chromosome ideogram indicate break points that divide the chromosome into sub-regions or bins. Name and fraction length of each bin is given below the break point and along the chromosome.



(a)

