

# **Marker-assisted introgression of three dominant blast resistance genes into an aromatic rice cultivar *Mushk Budji***

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**Supplementary Table S1: Agronomic performance of three-gene BC<sub>1</sub>F<sub>1</sub> derived BC<sub>1</sub>F<sub>2</sub> plants of *Mushk Budji* / DHMAS 70Q 164-1b**

<b>Plant ID</b>	<b>Pi54</b>	<b>Pi1</b>	<b>Pita</b>	<b>PH</b>	<b>NT</b>	<b>PL</b>	<b>SP</b>	<b>SF</b>	<b>GY</b>
SKUA-485-27-13	B	B	A	120	20	23	95	68.42	11.9
SKUA-485-27-20	B	B	B	104	12	21	115	72.2	8.6
SKUA-485-27-32	B	B	B	115	15	23	152	88.8	14.3
SKUA-485-27-43	B	A	B	133	21	24	175	69.1	23.0
SKUA-485-27-47	B	B	A	118	13	22	92	89.1	7.5
SKUA-485-27-50	B	B	B	123	12	19	93	97.8	7.0
SKUA-485-27-56	B	B	B	132	11	22	100	89.0	6.9
SKUA-485-27-61	B	B	B	140	15	21	85	82.9	8.0
SKUA-485-27-64	B	B	A	135	12	23	174	64.9	13.1
SKUA-485-27-70	B	B	B	117	21	21	197	84.3	25.9
SKUA-485-27-77	B	B	B	127	20	21	122	89.2	15.3
SKUA-485-27-78	B	B	B	103	16	21	112	85.2	11.2
SKUA-485-27-81	B	B	B	120	17	21	111	81.4	11.8
SKUA-485-27-86	A	B	B	113	20	23	146	80.1	18.3
<b>Mean</b>				<b>121.4</b> <b>±3.0</b>	<b>16.1</b> <b>±1.0</b>	<b>21.8</b> <b>±0.4</b>	<b>126.4</b> <b>±9.6</b>	<b>81.6</b> <b>±2.6</b>	<b>13.0</b> <b>±1.6</b>
<b>MAX</b>				<b>140.0</b>	<b>21.0</b>	<b>24.0</b>	<b>197.0</b>	<b>97.8</b>	<b>25.9</b>
<b>MIN</b>				<b>103.0</b>	<b>11.0</b>	<b>19.0</b>	<b>85.0</b>	<b>64.9</b>	<b>6.9</b>
<b>DHMAS 70Q 164-1b</b>	<b>B</b>	<b>B</b>	<b>B</b>	<b>107</b>	<b>15.6</b>	<b>20.5</b>	<b>124.7</b>	<b>65.2</b>	<b>12.2</b>
<b><i>Mushk Budji</i></b>	<b>A</b>	<b>A</b>	<b>A</b>	<b>127</b>	<b>15.4</b>	<b>19.6</b>	<b>114</b>	<b>86.1</b>	<b>11.0</b>

PH: Plant Height (cm), NT: Number of effective Tillers/ plant, PL: Panicle Length (cm), SP: Spikelets/ Plant, SF: Spikelet Fertility (%), GY: Grain Yield/ plant (g), A: Recipient (susceptible) parent allele, B: Donor (resistant) Parent allele

**Supplementary Table S2: Kernel traits and cooking quality of three-gene BC<sub>1</sub>F<sub>1</sub> derived BC<sub>1</sub>F<sub>2</sub> plants of *Mushk Budji*/ DHMAS 70Q 164-1b**

<b>Plant ID</b>	<b>Pi54</b>	<b>Pi1</b>	<b>Pita</b>	<b>KLBC</b>	<b>LBR</b>	<b>KLAC</b>	<b>KER</b>	<b>Aroma</b>
SKUA-485-27-13	B	B	A	4.50	1.8	7.00	1.56	1
SKUA-485-27-20	B	B	B	5.0	2.5	8.2	1.64	1
SKUA-485-27-32	B	B	B	4.5	1.8	7.0	1.56	2
SKUA-485-27-43	B	A	B	5.0	2.0	7.6	1.52	0
SKUA-485-27-47	B	B	A	4.5	1.8	7.0	1.56	2
SKUA-485-27-50	B	B	B	4.5	1.8	7.0	1.56	1
SKUA-485-27-56	B	B	B	5.0	2.5	7.8	1.56	2
SKUA-485-27-61	B	B	B	5.0	2.0	7.5	1.50	1
SKUA-485-27-64	B	B	A	4.4	1.8	7.0	1.59	1
SKUA-485-27-70	B	B	B	5.0	2.1	7.0	1.40	1
SKUA-485-27-77	B	B	B	4.5	2.3	8.4	1.87	1
SKUA-485-27-78	B	B	B	4.5	1.8	7.0	1.56	1
SKUA-485-27-81	B	B	B	4.5	1.9	7.0	1.56	1
SKUA-485-27-86	A	B	B	5.0	2.0	8.6	1.72	1
<b>Mean</b>				<b>4.7±0.1</b>	<b>2.0±0.1</b>	<b>7.4±0.2</b>	<b>1.58±0.1</b>	
<b>MAX</b>				<b>5.0</b>	<b>2.0</b>	<b>8.6</b>	<b>1.72</b>	
<b>MIN</b>				<b>4.4</b>	<b>2.2</b>	<b>7.0</b>	<b>1.59</b>	
<b>DHMAS 70Q 164-1b</b>	<b>B</b>	<b>B</b>	<b>B</b>	<b>6.5</b>	<b>2.6</b>	<b>10.5</b>	<b>1.62</b>	<b>0</b>
<b><i>Mushk Budji</i></b>	<b>A</b>	<b>A</b>	<b>A</b>	<b>5.2</b>	<b>1.6</b>	<b>7.7</b>	<b>1.48</b>	<b>2</b>

KLBC: Kernel Length Before Cooking (mm), LBR: Length Breadth Ratio, KLAC: Kernel Length After Cooking (mm), KER: Kernel Elongation Ratio, Aroma: (0-2 scale), A: Recipient parent allele, B: Donor Parent allele

**Supplementary Table S3: Agronomic performance of two-gene BC<sub>1</sub>F<sub>1</sub> derived BC<sub>1</sub>F<sub>2</sub> plants of *Mushk Budji/ DHMAS 70Q 164-1b***

<b>Plant ID</b>	<b>PH</b>	<b>NT</b>	<b>PL</b>	<b>SP</b>	<b>SF</b>	<b>GY</b>
SKUA-485-9-1	115	7	15	193	93	8.4
SKUA-485-9-2	108	6	18	218	88	8.2
SKUA-485-9-3	105	5	20	210	80	6.6
SKUA-485-9-4	145	26	29	181	78	29.4
SKUA-485-9-5	143	28	18	222	89	38.9
SKUA-485-9-6	140	15	23	185	94	17.3
SKUA-485-12-1	121	12	22	183	89	13.7
SKUA-485-12-2	117	19	23	179	85	21.3
SKUA-485-12-3	113	17	24	175	92	18.6
SKUA-485-14-1	110	17	22	228	92	24.2
SKUA-485-14-2	115	22	27	218	81	30.0
SKUA-485-14-3	118	13	23	204	88	16.6
SKUA-485-17-1	110	12	22	212	94	15.9
SKUA-485-17-2	115	15	25	209	93	19.6
SKUA-485-17-3	120	12	22	195	85	14.6
SKUA-485-21-1	145	13	29	202	79	16.4
SKUA-485-21-2	118	14	25	177	82	15.5
SKUA-485-21-3	122	9	22	181	77	10.2
SKUA-485-22-1	110	11	22	223	78	15.3
SKUA-485-22-2	107	11	21	190	95	13.1
SKUA-485-22-3	115	18	21	180	91	20.3
SKUA-485-26-1	115	19	24	201	75	23.9
SKUA-485-26-2	122	9	21	218	77	12.3
SKUA-485-26-3	121	10	20	222	90	13.9

PH: Plant Height (cm), NT: Number of effective Tillers/ plant, PL: Panicle Length (cm), SP: Spikelets/ Plant, SF: Spikelet Fertility (%), GY: Grain Yield/ plant (g)

**Supplementary Table S4: Kernel traits and cooking quality of two-gene BC<sub>1</sub>F<sub>1</sub> derived BC<sub>1</sub>F<sub>2</sub> plants of *Mushk Budji/ DHMAS 70Q 164-1b***

Plant ID	KLBC	LBR	KLAC	KER	Aroma	KLBC
SKUA-485-9-1	5.3	2.9	1.8	7.3	1.4	1
SKUA-485-9-2	5.0	3.0	1.7	7.0	1.4	1
SKUA-485-9-3	5.1	2.9	1.8	6.9	1.4	1
SKUA-485-9-4	5.1	3.0	1.7	7.2	1.4	1
SKUA-485-9-5	5.1	3.4	1.5	6.8	1.3	1
SKUA-485-9-6	4.9	3.0	1.6	7.3	1.5	1
SKUA-485-12-1	4.8	3.2	1.5	7.1	1.5	2
SKUA-485-12-2	5.2	3.4	1.5	6.8	1.3	2
SKUA-485-12-3	4.8	2.8	1.7	7.5	1.6	2
SKUA-485-14-1	5.0	3.5	1.4	6.8	1.4	1
SKUA-485-14-2	5.0	3.5	1.4	7.2	1.4	2
SKUA-485-14-3	4.9	3.5	1.4	7.5	1.5	1
SKUA-485-17-1	5.1	2.9	1.8	7.2	1.4	2
SKUA-485-17-2	5.0	2.9	1.7	7.3	1.5	2
SKUA-485-17-3	5.1	3.0	1.7	7.1	1.4	2
SKUA-485-21-1	4.8	3.1	1.5	7.4	1.5	2
SKUA-485-21-2	5.3	3.5	1.5	6.8	1.3	2
SKUA-485-21-3	4.8	3.5	1.4	7.5	1.6	2
SKUA-485-22-1	5.3	3.3	1.6	6.8	1.3	1
SKUA-485-22-2	4.8	3.3	1.5	7.5	1.6	1
SKUA-485-22-3	5.2	3.0	1.7	7.5	1.4	2
SKUA-485-26-1	4.9	3.4	1.4	7.2	1.5	1
SKUA-485-26-2	5.1	3.3	1.5	7.1	1.4	1
SKUA-485-26-3	4.9	3.0	1.6	6.9	1.4	1

KLBC: Kernel length before cooking (mm), KBBC: Kernel breadth before cooking (mm), LBR: Length breadth ratio, KLAC: Kernel length after cooking (mm), KER: Kernel elongation ratio, Aroma: (0-2 scale)

**Supplementary Table S5: Agronomic performance of BC<sub>1</sub>F<sub>2,3</sub> plants of *Mushk Budji*/ DHMAS 70Q 164-1b// *Mushk Budji***

Plant ID		PH	NT	PL	SP	SF	GY
BC <sub>1</sub> F <sub>2</sub>	BC <sub>1</sub> F <sub>3</sub>						
SKUA-485-27-13		120	20	23.0	95	68.4	11.9
	SKUA-485-27-13-1	117	24	24.5	142	82.4	21.3
	SKUA-485-27-13-2	126	18	27.0	143	93.7	16.1
	SKUA-485-27-13-3	127	10	23.0	172	91.3	30.8
	SKUA-485-27-13-4	129	14	27.5	157	89.2	13.7
	SKUA-485-27-13-5	127	13	22.5	139	84.2	11.3
	SKUA-485-27-13-6	118	10	24.0	153	91.5	29.6
	SKUA-485-27-13-7	130	13	23.5	149	85.9	12.1
	SKUA-485-27-13-8	129	14	23.0	153	92.2	13.4
	SKUA-485-27-13-9	125	18	25.0	137	84.7	15.4
	<b>Mean</b>	<b>125.33</b>	<b>14.89</b>	<b>24.44</b>	<b>149.44</b>	<b>88.33</b>	<b>18.81</b>
	<b>CV (%)</b>	<b>3.76</b>	<b>29.93</b>	<b>7.26</b>	<b>7.30</b>	<b>4.65</b>	<b>25.82</b>
SKUA-485-27-20		104	12	21	115	72.2	8.6
	SKUA-485-27-20-1	105	19	22.5	105	79.0	12.5
	SKUA-485-27-20-2	128	10	19.5	154	92.9	9.6
	SKUA-485-27-20-3	116	9	24.5	197	87.8	11.1
	SKUA-485-27-20-4	120	9	20.0	109	83.5	6.1
	SKUA-485-27-20-5	132	14	17.5	160	89.4	14.0
	SKUA-485-27-20-6	130	13	19.5	167	92.8	13.6
	SKUA-485-27-20-7	127	13	23.5	173	91.9	14.1
	SKUA-485-27-20-8	113	8	19.0	144	91.0	7.2
	SKUA-485-27-20-9	117	12	14.5	146	93.8	11.0
	SKUA-485-27-20-10	116	7	27.0	157	91.1	6.9
	SKUA-485-27-20-11	116	8	23.5	195	90.3	9.8
	SKUA-485-27-20-12	110	10	24.5	138	86.2	8.6
	SKUA-485-27-20-13	118	9	27.5	193	87.6	10.9
	<b>Mean</b>	<b>119.08</b>	<b>10.85</b>	<b>21.77</b>	<b>156.77</b>	<b>89.02</b>	<b>10.40</b>
	<b>CV (%)</b>	<b>6.77</b>	<b>30.31</b>	<b>17.48</b>	<b>18.75</b>	<b>4.72</b>	<b>25.85</b>
SKUA-485-27-32		115	15	23.0	152	88.8	14.3
	SKUA-485-27-32-1	129	12	25.5	184	96.2	23.8
	SKUA-485-27-32-2	127	6	20.5	139	89.2	15.2
	SKUA-485-27-32-3	130	13	26.5	186	89.8	15.1
	SKUA-485-27-32-4	115	11	22.5	160	96.9	11.0
	SKUA-485-27-32-5	123	12	27.5	150	94.0	21.3
	SKUA-485-27-32-6	116	12	24.0	109	75.2	8.2
	SKUA-485-27-32-7	123	9	23.0	105	72.4	5.9
	<b>Mean</b>	<b>123.29</b>	<b>10.71</b>	<b>24.21</b>	<b>147.57</b>	<b>87.67</b>	<b>10.07</b>
	<b>CV (%)</b>	<b>4.84</b>	<b>22.68</b>	<b>10.11</b>	<b>22.02</b>	<b>11.34</b>	<b>37.64</b>
SKUA-485-27-43		133	21	24	175	69.1	23.0
	SKUA-485-27-43-1	125	15	23.5	152	92.8	14.3
	SKUA-485-27-43-2	139	11	23.0	140	82.9	9.6
	SKUA-485-27-43-3	133	7	24.5	170	88.8	7.4
	SKUA-485-27-43-4	131	12	25.0	152	92.1	11.4
	SKUA-485-27-43-5	147	8	25.5	162	90.7	8.1
	SKUA-485-27-43-6	155	9	22.0	142	90.8	8.0
	SKUA-485-27-43-7	131	10	23.5	135	88.1	8.4
	SKUA-485-27-43-8	137	10	24.5	140	87.9	8.8
	SKUA-485-27-43-9	139	12	24.0	139	84.9	10.4
	<b>Mean</b>	<b>137.44</b>	<b>10.44</b>	<b>23.94</b>	<b>148.00</b>	<b>88.78</b>	<b>9.60</b>
	<b>CV (%)</b>	<b>6.62</b>	<b>23.01</b>	<b>4.48</b>	<b>8.02</b>	<b>3.70</b>	<b>22.44</b>
SKUA-485-27-47		118	13	22	92	89.1	7.5
	SKUA-485-27-47-1	134	17	23.0	135	91.1	14.3
	SKUA-485-27-47-2	133	15	24.0	143	90.2	13.4

	SKUA-485-27-47-3	130	22	24.5	147	91.2	20.2
	SKUA-485-27-47-4	139	18	27.5	193	90.2	21.7
	SKUA-485-27-47-5	138	17	26.5	194	88.1	20.6
	<b>Mean</b>	<b>134.80</b>	<b>17.80</b>	<b>25.10</b>	<b>162.40</b>	<b>90.16</b>	<b>18.06</b>
	<b>CV (%)</b>	<b>2.75</b>	<b>14.54</b>	<b>7.37</b>	<b>17.68</b>	<b>1.35</b>	<b>21.44</b>
SKUA-485-27-50		123	12	19	93	97.8	7.0
	SKUA-485-27-50-1	119	13	26.5	159	89.9	12.9
	SKUA-485-27-50-2	133	8	27.5	179	88.3	9.0
	SKUA-485-27-50-3	121	5	26.5	149	83.9	4.7
	SKUA-485-27-50-4	142	7	27.5	165	86.1	7.2
	SKUA-485-27-50-5	129	9	27.5	185	86.5	10.4
	SKUA-485-27-50-6	129	7	25.5	175	89.1	7.7
	<b>Mean</b>	<b>128.83</b>	<b>8.17</b>	<b>26.83</b>	<b>168.67</b>	<b>87.30</b>	<b>8.63</b>
	<b>CV (%)</b>	<b>6.48</b>	<b>33.23</b>	<b>3.04</b>	<b>7.99</b>	<b>2.57</b>	<b>32.91</b>
SKUA-485-27-56		132	11	22	100	89.0	6.9
	SKUA-485-27-56-1	157	7	24.5	115	83.5	5.0
	SKUA-485-27-56-2	153	18	25.5	109	86.2	12.3
	SKUA-485-27-56-3	145	17	27.0	197	87.8	20.9
	SKUA-485-27-56-4	140	18	26.5	105	86.7	11.8
	SKUA-485-27-56-5	134	12	22.0	103	87.4	7.7
	<b>Mean</b>	<b>145.80</b>	<b>14.40</b>	<b>25.10</b>	<b>125.80</b>	<b>86.32</b>	<b>11.55</b>
	<b>CV (%)</b>	<b>6.42</b>	<b>33.52</b>	<b>7.89</b>	<b>31.85</b>	<b>1.97</b>	<b>52.24</b>
SKUA-485-27-61		140	15	21	85	82.9	8.0
	SKUA-485-27-61-1	120	14	25.5	101	77.2	8.8
	SKUA-485-27-61-2	117	9	17.5	85	77.8	4.8
	SKUA-485-27-61-3	120	13	13.5	90	82.5	7.3
	SKUA-485-27-61-4	112	16	16.5	92	71.4	9.2
	SKUA-485-27-61-5	135	13	23.5	109	84.4	8.9
	SKUA-485-27-61-6	132	19	19.5	102	63.5	12.1
	<b>Mean</b>	<b>122.67</b>	<b>14.00</b>	<b>19.33</b>	<b>96.50</b>	<b>76.13</b>	<b>8.52</b>
	<b>CV (%)</b>	<b>7.29</b>	<b>23.90</b>	<b>23.23</b>	<b>9.29</b>	<b>10.10</b>	<b>28.29</b>
SKUA-485-27-64		135	12	23.0	174	64.9	13.1
	SKUA-485-27-64-1	139	20	27.0	65	84.6	8.1
	SKUA-485-27-64-2	156	17	24.5	85	82.4	9.0
	SKUA-485-27-64-3	158	9	25.5	75	84.0	4.2
	SKUA-485-27-64-4	145	14	21.5	112	83.0	9.8
	SKUA-485-27-64-5	148	9	26.5	77	88.3	4.3
	SKUA-485-27-64-6	141	10	27.0	105	93.3	6.6
	SKUA-485-27-64-7	137	18	23.5	153	85.6	17.2
	SKUA-485-27-64-8	134	20	23.0	146	87.0	18.3
	SKUA-485-27-64-9	144	10	21.5	135	88.1	8.4
	SKUA-485-27-64-10	141	7	28.0	117	90.6	5.1
	<b>Mean</b>	<b>144.30</b>	<b>13.40</b>	<b>24.80</b>	<b>107.00</b>	<b>86.70</b>	<b>9.11</b>
	<b>CV (%)</b>	<b>5.41</b>	<b>37.26</b>	<b>9.51</b>	<b>29.09</b>	<b>4.02</b>	<b>54.31</b>
SKUA-485-27-70		117	21	21	197	84.3	25.9
	SKUA-485-27-70-1	141	9	3.5	144	82.6	28.1
	SKUA-485-27-70-2	140	10	27.0	143	90.2	8.9
	SKUA-485-27-70-3	128	10	24.0	137	91.2	28.6
	SKUA-485-27-70-4	128	11	23.5	170	88.8	11.7
	SKUA-485-27-70-5	142	12	24.5	165	87.3	32.4
	<b>Mean</b>	<b>135.80</b>	<b>10.40</b>	<b>20.50</b>	<b>151.80</b>	<b>88.04</b>	<b>21.94</b>
	<b>CV (%)</b>	<b>5.27</b>	<b>10.96</b>	<b>46.82</b>	<b>9.68</b>	<b>3.82</b>	<b>19.67</b>
SKUA-485-27-77		127	20	21.0	122	49.2	15.3
	SKUA-485-27-77-1	145	17	23.5	109	91.7	11.6
	SKUA-485-27-77-2	132	21	22.0	107	89.7	24.0
	SKUA-485-27-77-3	123	19	23.0	111	90.2	18.2
	SKUA-485-27-77-4	114	22	22.5	105	93.3	24.4
	SKUA-485-27-77-5	117	18	24.0	102	85.3	15.5

	SKUA-485-27-77-6	136	20	25.5	101	94.1	18.6
	<b>Mean</b>	<b>127.83</b>	<b>19.50</b>	<b>23.42</b>	<b>105.83</b>	<b>90.73</b>	<b>18.72</b>
	<b>CV (%)</b>	<b>9.33</b>	<b>9.59</b>	<b>5.30</b>	<b>3.70</b>	<b>3.47</b>	<b>9.56</b>
SKUA-485-27-78-		<b>103</b>	<b>16</b>	<b>21.0</b>	<b>112</b>	<b>65.2</b>	<b>11.2</b>
	SKUA-485-27-78-1	125	18	22.0	105	88.6	11.8
	SKUA-485-27-78-2	117	21	23.5	112	84.8	14.7
	SKUA-485-27-78-3	132	19	22.5	97	80.4	11.5
	SKUA-485-27-78-4	114	17	19.0	77	81.8	8.2
	SKUA-485-27-78-5	126	18	19.0	45	71.1	5.1
	<b>Mean</b>	<b>122.80</b>	<b>18.60</b>	<b>21.20</b>	<b>87.20</b>	<b>81.35</b>	<b>10.26</b>
	<b>CV (%)</b>	<b>5.91</b>	<b>8.15</b>	<b>9.81</b>	<b>30.95</b>	<b>8.02</b>	<b>36.17</b>
SKUA-485-27-81-		120	17	21	111	81.4	11.8
	SKUA-485-27-81-1	117	9	22.5	133	94.7	7.5
	SKUA-485-27-81-2	127	6	24.0	129	92.2	4.8
	SKUA-485-27-81-3	124	7	19.5	143	91.6	6.3
	SKUA-485-27-81-4	136	4	23.5	137	89.2	7.2
	SKUA-485-27-81-5	135	10	21.5	137	90.5	8.6
	SKUA-485-27-81-6	115	8	22.0	135	93.3	6.8
	SKUA-485-27-81-7	121	9	21.0	143	92.3	8.0
	SKUA-485-27-81-8	137	25	22.5	153	94.1	23.9
	<b>Mean</b>	<b>126.50</b>	<b>9.75</b>	<b>22.06</b>	<b>139.00</b>	<b>92.26</b>	<b>9.13</b>
	<b>CV (%)</b>	<b>6.89</b>	<b>66.19</b>	<b>6.46</b>	<b>5.76</b>	<b>1.99</b>	<b>66.58</b>
SKUA-485-27-86-		113	20	23.0	146	80.1	18.3
	SKUA-485-27-86-1	138	10	22.5	139	85.5	18.7
	SKUA-485-27-86-2	130	11	24.5	167	85.6	21.5
	SKUA-485-27-86-3	123	6	20.0	124	79.6	14.7
	SKUA-485-27-86-4	128	8	25.0	118	64.6	15.9
	SKUA-485-27-86-5	120	8	17.5	112	61.9	15.6
	SKUA-485-27-86-6	114	10	21.0	143	74.0	28.9
	SKUA-485-27-86-7	116	7	20.5	125	58.2	5.5
	SKUA-485-27-86-8	105	16	19.5	115	75.6	30.5
	SKUA-485-27-86-9	130	8	23.5	162	71.7	18.1
	SKUA-485-27-86-10	130	8	23.5	135	72.3	216.8
	<b>Mean</b>	<b>123.40</b>	<b>9.20</b>	<b>21.75</b>	<b>134.00</b>	<b>72.89</b>	<b>18.71</b>
	<b>CV (%)</b>	<b>7.91</b>	<b>30.66</b>	<b>11.17</b>	<b>14.21</b>	<b>12.78</b>	<b>31.85</b>
<b>DHMAS 70Q 164-2b</b>		<b>104</b>	<b>13</b>	<b>15</b>	<b>108</b>	<b>61</b>	<b>8.78</b>
<i>Mushk Budji</i>		<b>123</b>	<b>19</b>	<b>19</b>	<b>121</b>	<b>84</b>	<b>14.37</b>
	<b>Overall Mean</b>	<b>129.85</b>	<b>13.01</b>	<b>23.18</b>	<b>134.28</b>	<b>86.12</b>	<b>10.68</b>
	<b>Grand CV (%)</b>	<b>6.12</b>	<b>26.71</b>	<b>12.14</b>	<b>15.45</b>	<b>5.32</b>	<b>33.20</b>

PH: Plant Height (cm), NT: Number of effective Tillers/ plant, PL: Panicle Length (cm), SP: Spikelets/ Plant, SF: Spikelet Fertility (%), GY: Grain Yield/ plant (g)



**Supplementary Table S6: Kernel traits and cooking quality of BC<sub>1</sub>F<sub>2:3</sub> plants of *Mushk Budji*/DHMAS 70Q 164-1b//*Mushk Budji***

Plant ID		KLBC	LBR	KLAC	KER	Aroma
BC <sub>1</sub> F <sub>2</sub>	BC <sub>1</sub> F <sub>3</sub>					
SKUA-485-27-13		4.5	1.8	7.0	1.6	2
	SKUA-485-27-13-1	4.8	1.7	6.7	1.4	2
	SKUA-485-27-13-2	4.3	1.5	6.0	1.4	0
	SKUA-485-27-13-3	4.8	1.7	6.5	1.4	1
	SKUA-485-27-13-4	5.0	1.7	7.0	1.4	2
	SKUA-485-27-13-5	4.8	1.7	6.8	1.4	1
	SKUA-485-27-13-6	4.5	1.6	6.8	1.5	2
	SKUA-485-27-13-7	4.5	2.3	6.6	1.5	2
	SKUA-485-27-13-8	5.1	2.6	7.7	1.5	0
	SKUA-485-27-13-9	5.1	2.6	7.4	1.4	0
	<b>Mean</b>	<b>4.75</b>	<b>1.93</b>	<b>6.83</b>	<b>1.44</b>	
	<b>CV (%)</b>	<b>6.32</b>	<b>21.19</b>	<b>7.28</b>	<b>3.30</b>	
SKUA-485-27-20		5.0	2.5	8.2	1.64	1
	SKUA-485-27-20-1	4.8	1.6	6.1	1.3	0
	SKUA-485-27-20-2	5.0	1.7	6.0	1.2	2
	SKUA-485-27-20-3	5.1	1.7	6.6	1.3	1
	SKUA-485-27-20-4	4.3	1.6	5.9	1.4	0
	SKUA-485-27-20-5	4.8	1.7	6.5	1.4	2
	SKUA-485-27-20-6	5.1	2.0	7.0	1.4	0
	SKUA-485-27-20-7	5.8	1.9	7.0	1.2	1
	SKUA-485-27-20-8	5.1	1.8	6.7	1.3	2
	SKUA-485-27-20-9	5.1	2.0	6.7	1.3	1
	SKUA-485-27-20-10	5.1	1.7	6.9	1.3	1
	SKUA-485-27-20-11	5.4	2.2	7.6	1.4	2
	SKUA-485-27-20-12	5.1	1.7	6.9	1.3	0
	SKUA-485-27-20-13	5.4	1.8	7.2	1.3	2
	<b>Mean</b>	<b>5.08</b>	<b>1.79</b>	<b>6.70</b>	<b>1.32</b>	
	<b>CV (%)</b>	<b>7.07</b>	<b>9.01</b>	<b>7.29</b>	<b>4.70</b>	
SKUA-485-27-32		4.5	1.8	7.0	1.6	2
	SKUA-485-27-32-1	5.1	2.1	7.0	1.4	2
	SKUA-485-27-32-2	5.0	2.0	6.8	1.4	1
	SKUA-485-27-32-3	5.1	2.4	7.2	1.4	1
	SKUA-485-27-32-4	4.8	2.2	6.6	1.4	1
	SKUA-485-27-32-5	4.8	1.9	6.8	1.4	2
	SKUA-485-27-32-6	5.1	2.1	7.1	1.4	2
	SKUA-485-27-32-7	4.8	1.9	6.4	1.3	2
	<b>Mean</b>	<b>4.95</b>	<b>2.08</b>	<b>6.84</b>	<b>1.38</b>	
	<b>CV (%)</b>	<b>3.82</b>	<b>8.94</b>	<b>4.12</b>	<b>2.08</b>	
SKUA-485-27-43		5.0	2.0	7.6	1.52	0
	SKUA-485-27-43-1	5.8	2.9	7.2	1.3	0
	SKUA-485-27-43-2	5.1	2.3	6.8	1.3	0
	SKUA-485-27-43-3	5.8	2.0	7.0	1.2	0
	SKUA-485-27-43-4	5.1	2.0	7.0	1.4	0
	SKUA-485-27-43-5	5.1	1.7	6.8	1.3	0
	SKUA-485-27-43-6	5.1	2.1	6.8	1.3	0
	SKUA-485-27-43-7	5.4	2.2	6.8	1.3	0
	SKUA-485-27-43-8	5.1	1.7	7.2	1.4	0
	SKUA-485-27-43-9	5.0	1.8	6.8	1.4	0
	<b>Mean</b>	<b>5.28</b>	<b>2.06</b>	<b>6.93</b>	<b>1.32</b>	
	<b>CV (%)</b>	<b>5.40</b>	<b>17.51</b>	<b>2.50</b>	<b>4.58</b>	
SKUA-485-27-47		4.5	1.8	7.0	1.56	1
	SKUA-485-27-47-1	4.6	1.7	7.2	1.6	2
	SKUA-485-27-47-2	4.8	1.9	6.9	1.5	2

	SKUA-485-27-47-3	4.5	1.7	6.5	1.4	2
	SKUA-485-27-47-4	5.8	1.9	7.0	1.2	2
	SKUA-485-27-47-5	4.5	1.8	6.2	1.4	2
	<b>Mean</b>	<b>4.83</b>	<b>1.80</b>	<b>6.76</b>	<b>1.41</b>	
	<b>CV (%)</b>	<b>10.93</b>	<b>5.88</b>	<b>5.97</b>	<b>8.88</b>	
SKUA-485-27-50		4.5	1.8	7.0	1.56	1
	SKUA-485-27-50-1	5.3	2.6	6.7	1.3	0
	SKUA-485-27-50-2	5.5	2.8	7.2	1.3	2
	SKUA-485-27-50-3	5.8	2.3	7.3	1.3	0
	SKUA-485-27-50-4	5.5	2.0	7.1	1.3	1
	SKUA-485-27-50-5	5.3	2.0	6.9	1.3	0
	SKUA-485-27-50-6	5.0	1.8	6.8	1.4	2
	<b>Mean</b>	<b>5.38</b>	<b>2.25</b>	<b>7.00</b>	<b>1.30</b>	
	<b>CV (%)</b>	<b>4.88</b>	<b>16.69</b>	<b>3.38</b>	<b>2.52</b>	
SKUA-485-27-56		5.0	2.5	7.8	1.56	1
	SKUA-485-27-56-1	4.8	1.7	6.9	1.5	0
	SKUA-485-27-56-2	4.8	1.7	6.6	1.4	0
	SKUA-485-27-56-3	4.3	1.7	6.8	1.6	1
	SKUA-485-27-56-4	4.5	2.0	6.6	1.5	0
	<b>Mean</b>	<b>4.56</b>	<b>1.79</b>	<b>6.73</b>	<b>1.48</b>	
	<b>CV (%)</b>	<b>5.25</b>	<b>7.91</b>	<b>2.23</b>	<b>5.99</b>	
SKUA-485-27-64		4.4	1.8	7.0	1.6	1
	SKUA-485-27-64-1	5.1	2.6	7.5	1.5	1
	SKUA-485-27-64-2	5.0	2.0	6.7	1.3	2
	SKUA-485-27-64-3	5.3	1.9	7.2	1.4	1
	SKUA-485-27-64-4	5.1	2.3	7.3	1.4	1
	SKUA-485-27-64-5	5.3	2.6	7.2	1.4	1
	SKUA-485-27-64-6	4.8	1.9	6.9	1.5	2
	SKUA-485-27-64-7	5.1	2.1	7.0	1.4	1
	SKUA-485-27-64-8	5.0	2.0	6.9	1.4	1
	SKUA-485-27-64-9	5.8	2.9	7.6	1.3	2
	SKUA-485-27-64-10	5.8	2.3	7.4	1.3	1
	<b>Mean</b>	<b>5.21</b>	<b>2.25</b>	<b>7.17</b>	<b>1.38</b>	
	<b>CV (%)</b>	<b>6.09</b>	<b>15.08</b>	<b>4.06</b>	<b>4.06</b>	
SKUA-485-27-70		5.0	2.1	7.0	1.40	1
	SKUA-485-27-70-1	5.0	2.0	7.0	1.4	0
	SKUA-485-27-70-2	5.4	2.4	7.0	1.3	0
	SKUA-485-27-70-3	4.5	2.3	6.8	1.5	0
	SKUA-485-27-70-4	5.1	2.1	7.0	1.4	0
	SKUA-485-27-70-5	4.8	2.1	6.5	1.4	0
	<b>Mean</b>	<b>4.95</b>	<b>2.16</b>	<b>6.86</b>	<b>1.39</b>	
	<b>CV (%)</b>	<b>6.82</b>	<b>7.34</b>	<b>3.19</b>	<b>5.52</b>	
SKUA-485-27-77		4.5	2.3	8.4	1.9	1
	SKUA-485-27-77-1	4.8	1.9	6.7	1.4	1
	SKUA-485-27-77-2	5.4	2.2	7.2	1.3	0
	SKUA-485-27-77-3	5.3	2.1	7.2	1.4	0
	SKUA-485-27-77-4	5.3	2.1	7.2	1.4	2
	SKUA-485-27-77-5	5.0	2.0	6.7	1.3	1
	SKUA-485-27-77-6	5.4	2.4	7.1	1.3	0
	<b>Mean</b>	<b>5.17</b>	<b>2.11</b>	<b>7.02</b>	<b>1.36</b>	
	<b>CV (%)</b>	<b>4.76</b>	<b>7.82</b>	<b>3.54</b>	<b>2.36</b>	
SKUA-485-27-78		4.5	1.8	7.0	1.6	1
	SKUA-485-27-78-1	4.5	1.6	6.6	1.5	1
	SKUA-485-27-78-2	4.8	1.9	6.9	1.5	0
	SKUA-485-27-78-3	4.5	1.6	6.8	1.5	0
	SKUA-485-27-78-4	4.5	2.0	6.7	1.5	1
	SKUA-485-27-78-5	4.8	2.4	6.8	1.4	0
	<b>Mean</b>	<b>4.60</b>	<b>1.91</b>	<b>6.76</b>	<b>1.47</b>	

	<b>CV (%)</b>	<b>2.98</b>	<b>16.02</b>	<b>1.69</b>	<b>2.11</b>	
SKUA-485-27-81-		4.5	1.9	7.0	1.56	1
	SKUA-485-27-81-1	4.5	1.6	6.8	1.5	0
	SKUA-485-27-81-2	5.3	1.9	7.1	1.4	1
	SKUA-485-27-81-3	4.5	1.6	6.4	1.4	1
	SKUA-485-27-81-4	5.0	2.0	7.1	1.4	1
	SKUA-485-27-81-5	4.8	2.1	6.6	1.4	2
	SKUA-485-27-81-6	4.8	1.7	6.8	1.4	1
	SKUA-485-27-81-7	5.0	2.0	7.0	1.4	2
	SKUA-485-27-81-8	5.0	2.0	6.4	1.3	2
	<b>Mean</b>	<b>4.84</b>	<b>1.88</b>	<b>6.78</b>	<b>1.40</b>	
	<b>CV (%)</b>	<b>5.47</b>	<b>9.85</b>	<b>4.23</b>	<b>4.75</b>	
SKUA-485-27-86-		5.0	2.0	8.6	1.7	1
	SKUA-485-27-86-1	4.8	1.7	7.3	1.5	0
	SKUA-485-27-86-2	5.0	2.0	7.2	1.4	1
	SKUA-485-27-86-3	5.0	1.8	6.7	1.3	0
	SKUA-485-27-86-4	5.0	2.2	6.9	1.4	0
	SKUA-485-27-86-5	5.0	2.5	6.9	1.4	2
	SKUA-485-27-86-6	5.0	1.8	7.1	1.4	2
	SKUA-485-27-86-7	4.8	1.9	6.8	1.4	0
	SKUA-485-27-86-8	4.8	1.9	6.4	1.3	2
	SKUA-485-27-86-9	4.8	1.7	6.8	1.4	1
	SKUA-485-27-86-10	5.0	1.7	6.8	1.4	0
	<b>Mean</b>	<b>4.90</b>	<b>1.94</b>	<b>6.89</b>	<b>1.41</b>	
	<b>CV (%)</b>	<b>2.63</b>	<b>12.89</b>	<b>3.78</b>	<b>4.17</b>	
<b>DHMAS 70Q 164-1b</b>		<b>6.5</b>	<b>2.5</b>	<b>10.3</b>	<b>1.58</b>	<b>0</b>
<i>Mushk Budji</i>		<b>5.1</b>	<b>1.6</b>	<b>7.5</b>	<b>1.47</b>	<b>2</b>
	<b>Overall Mean</b>	<b>4.96</b>	<b>2.00</b>	<b>6.87</b>	<b>1.39</b>	
	<b>Grand CV (%)</b>	<b>5.64</b>	<b>11.62</b>	<b>4.00</b>	<b>4.22</b>	

KLBC: Kernel Length Before Cooking (mm), LBR: Length Breadth Ratio, KLAC: Kernel Length After Cooking (mm), KER: Kernel Elongation Ratio, Aroma: (0-2 scale)

**Supplementary Table S7: Agronomic performance of BC<sub>2</sub>F<sub>2</sub> plants of *Mushk Budji*/ DHMAS 70Q 164-1b// *Mushk Budji*// *Mushk Budji***

Plant ID	PH	NT	PL	SP	SF	GY	Decision
SKUA-485-27-4-							
SKUA-485-27-4-1	106	15	24.0	204	82.4	23.0	Selected
SKUA-485-27-4-2	118	15	23.5	215	87.4	24.1	Selected
SKUA-485-27-4-3	113	19	24.0	68	68.9	9.6	
SKUA-485-27-4-4	100	9	22.0	138	87.0	9.3	
SKUA-485-27-4-5	120	10	18.5	164	88.1	12.3	
SKUA-485-27-4-6	106	23	24.5	293	87.4	50.5	Selected
SKUA-485-27-4-7	125	4	23.5	221	87.1	6.6	
SKUA-485-27-4-8	130	8	17.5	138	91.3	8.3	
SKUA-485-27-4-9	100	14	25.5	164	78.9	17.2	
SKUA-485-27-4-10	115	12	24.0	143	74.7	12.8	Selected
SKUA-485-27-4-11	117	5	22.0	159	91.5	6.0	
SKUA-485-27-4-12	119	9	28.0	230	94.1	15.5	
SKUA-485-27-4-13	124	11	-	-	-	-	
SKUA-485-27-4-14	110	13	22.5	161	77.1	15.6	Selected
SKUA-485-27-4-15	122	17	17.7	71	59.6	9.0	Selected
SKUA-485-27-4-16	121	11	20.0	128	75.3	10.5	
SKUA-485-27-4-17	105	10	24.5	158	88.6	11.8	
SKUA-485-27-4-18	133	27	22.5	132	85.2	26.7	
SKUA-485-27-4-19	114	13	16.5	69	60.9	6.7	Selected
SKUA-485-27-4-20	107	7	20.8	128	60.0	6.7	
SKUA-485-27-4-21	97	7	25.0	159	89.6	8.3	
SKUA-485-27-4-22	99	7	27.5	168	78.6	8.8	
SKUA-485-27-4-23	115	7	21.5	200	85.0	10.5	Selected
SKUA-485-27-4-24	106	7	27.5	203	85.9	10.6	Selected
SKUA-485-27-4-25	113	7	22.5	158	91.4	8.3	
SKUA-485-27-4-26	104	10	26.0	221	84.4	16.5	
SKUA-485-27-4-27	126	7	21.5	146	76.3	7.6	Selected
SKUA-485-27-4-28	124	10	22.5	278	96.2	20.8	
SKUA-485-27-4-29	117	7	22.5	167	81.1	8.7	
SKUA-485-27-4-30	97	9	27.5	230	96.1	15.5	
SKUA-485-27-4-31	113	8	20.5	86	87.7	5.1	
SKUA-485-27-4-32	118	8	27.0	203	85.2	12.2	Selected
SKUA-485-27-4-33	131	11	23.5	158	78.6	13.0	Selected
SKUA-485-27-4-34	116	11	17.5	213	86.6	17.6	
SKUA-485-27-4-35	125	11	23.5	221	89.8	18.2	
SKUA-485-27-4-36	121	8	16.5	203	92.6	12.2	
SKUA-485-27-4-37	129	10	19.5	146	85.6	10.9	
SKUA-485-27-4-38	123	16	19.0	80	82.3	9.5	Selected
SKUA-485-27-4-39	107	4	13.7	71	76.6	2.1	
SKUA-485-27-4-40	114	9	17.5	65	80.0	7.4	Selected
SKUA-485-27-4-41	127	5	20.0	105	87.1	3.9	
SKUA-485-27-4-42	126	4	18.5	101	79.1	3.0	
SKUA-485-27-4-43	112	4	19.5	74	63.3	2.2	
SKUA-485-27-4-44	130	5	20.5	134	88.8	5.0	
SKUA-485-27-4-45	129	5	23.5	276	92.9	10.4	
SKUA-485-27-4-46	110	6	24.5	269	87.2	12.1	
SKUA-485-27-4-47	114	10	25.5	278	84.1	20.8	
SKUA-485-27-4-48	112	12	19.0	293	96.9	26.3	

SKUA-485-27-4-49	113	5	23.5	179	94.1	6.7	
SKUA-485-27-4-50	107	6	24.5	158	77.1	7.1	Selected
SKUA-485-27-4-51	122	9	20.0	161	86.9	10.8	
SKUA-485-27-4-52	122	9	20.5	171	82.5	11.5	Selected
SKUA-485-27-4-53	95	6	14.5	164	86.2	7.4	
SKUA-485-27-4-54	127	7	24.5	159	82.1	8.3	Selected
SKUA-485-27-4-55	103	9	19.5	168	83.0	11.3	
SKUA-485-27-4-56	122	7	20.0	131	88.5	6.9	
SKUA-485-27-4-57	120	15	15.5	218	83.4	24.5	Selected
SKUA-485-27-4-58	137	10	22.0	203	81.5	15.2	Selected
SKUA-485-27-4-59	105	5	22.5	143	82.1	5.3	
SKUA-485-27-4-60	103	5	24.0	221	87.1	8.3	
SKUA-485-27-4-61	121	6	20.5	132	77.3	5.9	Selected
SKUA-485-27-4-62	121	4	20.5	98	81.5	2.9	
SKUA-485-27-4-63	123	7	16.6	68	66.7	3.5	
SKUA-485-27-4-64	110	4	20.0	221	93.9	6.6	
SKUA-485-27-4-65	128	4	25.5	288	90.1	8.6	
SKUA-485-27-4-66	129	4	22.2	165	90.0	5.0	
SKUA-485-27-4-67	124	4	24.5	296	92.4	8.9	
SKUA-485-27-4-68	116	6	23.5	293	96.4	13.2	
SKUA-485-27-4-69	104	7	23.5	218	91.0	11.4	
SKUA-485-27-4-70	132	3	21.0	206	92.0	4.6	
SKUA-485-27-4-71	107	4	26.5	170	91.2	5.1	
SKUA-485-27-4-72	106	5	23.5	231	92.9	8.7	
SKUA-485-27-4-73	109	6	19.5	158	81.0	7.1	
SKUA-485-27-4-74	97	3	20.5	116	84.4	2.6	
SKUA-485-27-4-75	106	7	17.5	99	78.8	5.2	
SKUA-485-27-4-76	132	5	19.5	110	67.1	4.1	
SKUA-485-27-4-77	107	7	15.0	80	81.1	4.2	
SKUA-485-27-4-78	115	10	24.5	168	80.4	12.6	
SKUA-485-27-4-79	158	13	19.5	83	60.0	8.0	Selected
SKUA-485-27-4-80	136	5	23.5	168	81.3	6.3	
SKUA-485-27-4-81	121	9	26.0	233	91.0	15.7	
SKUA-485-27-4-82	120	6	14.5	146	88.7	6.5	
SKUA-485-27-4-83	122	9	19.0	231	70.8	15.6	
SKUA-485-27-4-84	130	5	22.5	296	93.4	11.1	
SKUA-485-27-4-85	132	12	21.5	285	94.2	25.7	
SKUA-485-27-4-86	119	6	20.5	180	90.8	8.1	
SKUA-485-27-4-87	110	6	109.0	155	79.6	7.0	Selected
SKUA-485-27-4-88	134	7	17.5	161	82.2	8.4	
SKUA-485-27-4-89	107	7	19.5	168	83.9	8.8	
SKUA-485-27-4-90	114	5	15.0	137	73.6	5.1	
SKUA-485-27-4-91	121	8	24.5	128	83.5	7.7	
SKUA-485-27-4-92	110	5	19.5	171	79.8	6.4	
SKUA-485-27-4-93	121	7	23.5	128	75.3	6.7	
SKUA-485-27-4-94	120	9	26.0	174	88.8	11.7	
SKUA-485-27-4-95	109	7	14.5	132	85.2	6.9	
SKUA-485-27-4-96	149	9	19.0	170	89.4	11.4	
SKUA-485-27-4-97	125	9	22.5	153	87.3	10.3	
SKUA-485-27-4-98	117	18	21.5	176	90.6	23.7	
<b>Family mean</b>	<b>117.22</b>	<b>8.45</b>	<b>22.36</b>	<b>170</b>	<b>83.43</b>	<b>10.77</b>	
	<b>±1.92</b>	<b>±0.73</b>	<b>±1.66</b>	<b>±9.82</b>	<b>±1.89</b>	<b>±1.16</b>	
<b>CV (%)</b>	<b>9.68</b>	<b>49.67</b>	<b>42.46</b>	<b>35</b>	<b>10.67</b>	<b>65.40</b>	

SKUA-485-27-7-							
SKUA-485-27-7-1	113	13	17.5	170	81.4	16.5	
SKUA-485-27-7-2	125	15	14.0	198	86.4	22.3	
SKUA-485-27-7-3	134	13	27.0	195	90.0	19.0	Selected
SKUA-485-27-7-4	132	14	27.0	218	82.1	22.8	
SKUA-485-27-7-5	126	10	27.0	180	80.8	13.5	Selected
SKUA-485-27-7-6	114	13	15.7	218	85.5	21.2	
SKUA-485-27-7-7	125	16	15.0	105	74.3	12.6	
SKUA-485-27-7-8	127	10	18.5	90	66.7	6.8	Selected
SKUA-485-27-7-9	129	11	45.0	240	93.8	19.8	Selected
SKUA-485-27-7-10	114	15	16.5	200	84.2	22.4	
SKUA-485-27-7-11	125	14	45.0	231	93.5	24.3	Selected
SKUA-485-27-7-12	121	14	16.3	168	77.7	17.6	Selected
SKUA-485-27-7-13	114	13	15.7	218	85.5	21.2	Selected
SKUA-485-27-7-14	125	16	15.0	105	74.3	12.6	Selected
SKUA-485-27-7-15	121	11	17.5	158	77.1	13.0	Selected
SKUA-485-27-7-16	114	8	18.5	81	81.5	4.9	
SKUA-485-27-7-17	114	12	22.0	120	77.5	10.8	Selected
SKUA-485-27-7-18	112	16	27.5	288	89.1	34.6	
SKUA-485-27-7-19	143	13	22.5	173	92.2	16.8	
SKUA-485-27-7-20	112	18	27.5	171	81.6	23.1	
SKUA-485-27-7-21	143	12	23.5	173	86.1	15.5	
SKUA-485-27-7-22	114	13	24.0	81	77.8	7.9	
SKUA-485-27-7-23	154	9	25.5	264	85.5	17.8	
SKUA-485-27-7-24	104	9	22.5	203	88.9	13.7	
SKUA-485-27-7-25	135	8	20.0	83	60.0	5.0	Selected
SKUA-485-27-7-26	114	9	18.0	81	77.8	5.5	Selected
SKUA-485-27-7-27	154	10	25.5	270	86.1	20.3	
SKUA-485-27-7-28	104	9	22.5	203	91.9	13.7	
SKUA-485-27-7-29	97	6	23.5	249	86.1	11.2	
SKUA-485-27-7-30	123	11	25.6	231	85.1	19.1	
SKUA-485-27-7-31	133	6	13.0	96	67.2	4.3	Selected
SKUA-485-27-7-32	104	9	22.5	203	91.9	13.7	
SKUA-485-27-7-33	123	10	21.5	180	89.2	13.5	Selected
SKUA-485-27-7-34	125	17	16.0	105	74.3	13.4	
SKUA-485-27-7-35	144	8	26.5	270	86.7	16.2	Selected
SKUA-485-27-7-36	104	9	35.0	165	89.1	11.1	Selected
SKUA-485-27-7-37	104	14	28.5	248	85.5	26.0	
SKUA-485-27-7-38	117	12	21.5	120	76.3	10.8	Selected
SKUA-485-27-7-39	112	16	27.5	288	89.1	34.6	
SKUA-485-27-7-40	143	13	22.5	173	92.2	16.8	
<b>Family mean</b>	<b>122.28</b>	<b>11.88</b>	<b>22.90</b>	<b>180</b>	<b>83.04</b>	<b>16.14</b>	
	<b>±2.31</b>	<b>±0.58</b>	<b>±1.21</b>	<b>±10.87</b>	<b>±1.18</b>	<b>±2.57</b>	
<b>CV (%)</b>	<b>11.43</b>	<b>25.53</b>	<b>31.10</b>	<b>35</b>	<b>9.34</b>	<b>43.92</b>	
SKUA-485-27-8-							
SKUA-485-27-8-1	123	12	25	213	91.5	19.2	Selected
SKUA-485-27-8-2	116	10	23	185	82.1	13.8	
SKUA-485-27-8-3	114	9	18	81	77.8	15.5	Selected
SKUA-485-27-8-4	145	13	19	158	78.1	15.4	
SKUA-485-27-8-5	156	16	22.5	158	91.4	18.9	Selected
SKUA-485-27-8-6	104	13	27.5	263	85.7	25.6	
SKUA-485-27-8-7	154	10	25.5	270	86.1	20.3	Selected
SKUA-485-27-8-8	104	9	22.5	203	91.9	13.7	Selected

SKUA-485-27-8-9	97	6	23.5	249	86.1	11.2	Selected
SKUA-485-27-8-10	100	7	21	176	81.2	9.2	
SKUA-485-27-8-11	108	13	18.5	116	87.0	11.3	Selected
SKUA-485-27-8-12	134	18	15.5	99	77.3	13.4	Selected
SKUA-485-27-8-13	144	23	21.3	218	82.1	37.5	Selected
SKUA-485-27-8-14	104	22	27	221	88.4	36.4	
SKUA-485-27-8-15	117	13	19	98	58.5	9.5	
SKUA-485-27-8-16	121	14	25.5	203	85.9	21.3	
SKUA-485-27-8-17	116	13	27.5	198	90.9	19.3	
SKUA-485-27-8-18	125	16	25	161	87.9	19.3	
SKUA-485-27-8-19	121	11	25.5	233	86.5	19.2	
SKUA-485-27-8-20	108	13	25.5	239	94.3	23.3	
SKUA-485-27-8-21	135	8	28	233	89.0	14.0	
SKUA-485-27-8-22	138	9	23	209	90.6	14.1	
SKUA-485-27-8-23	133	8	22.5	188	88.8	11.3	
SKUA-485-27-8-24	123	11	21.5	135	86.7	11.1	
SKUA-485-27-8-25	145	8	23.5	165	89.1	9.9	
SKUA-485-27-8-26	123	11	22.5	113	74.7	9.3	
SKUA-485-27-8-27	127	11	17	68	57.8	5.6	
SKUA-485-27-8-28	121	19	24.5	174	81.0	24.8	Selected
SKUA-485-27-8-29	128	19	22	158	82.9	22.4	
SKUA-485-27-8-30	122	12	21.5	233	88.4	20.9	
SKUA-485-27-8-31	117	15	22	249	91.0	28.0	
SKUA-485-27-8-32	124	14	20	203	88.1	21.3	
SKUA-485-27-8-33	122	17	19.5	182	88.4	23.1	
SKUA-485-27-8-34	107	12	19	171	89.5	15.4	
SKUA-485-27-8-35	133	14	27	215	85.3	22.5	
SKUA-485-27-8-36	137	7	28	239	85.5	12.5	
SKUA-485-27-8-37	133	8	26.5	198	83.3	11.9	
<b>Family mean</b>	<b>123.76</b>	<b>12.54</b>	<b>22.86</b>	<b>185</b>	<b>84.62</b>	<b>17.59</b>	
	<b>±2.5</b>	<b>±0.66</b>	<b>±0.54</b>	<b>±8.67</b>	<b>±1.35</b>	<b>±1.30</b>	
<b>CV (%)</b>	<b>11.84</b>	<b>33.02</b>	<b>14.42</b>	<b>28</b>	<b>9.27</b>	<b>43.02</b>	
<b>DHMAS 70Q 164-1b</b>	<b>104</b>	<b>13</b>	<b>15</b>	<b>108</b>	<b>61</b>	<b>8.78</b>	
<b><i>Mushk Budji</i></b>	<b>123</b>	<b>19</b>	<b>19</b>	<b>121</b>	<b>84</b>	<b>14.37</b>	

PH: Plant Height (cm), NT: Number of effective Tillers/ plant, PL: Panicle Length (cm), SP: Spikelets/ Plant, SF: Spikelet Fertility (%), GY: Grain Yield/ plant (g)

**Supplementary Table S8: Marker-assisted foreground selection, evaluation for kernel traits and cooking quality of selected BC<sub>2</sub>F<sub>2</sub> progenies**

Plant ID	KLBC	KBBC	LBR	KLAC	KER	Aroma	Gene status		
							<i>Pita</i>	<i>Pil</i>	<i>Pi54</i>
SKUA-485-27-4-							<i>Pita</i>	<i>Pil</i>	<i>Pi54</i>
SKUA-485-27-4-1	5.0	3.3	1.5	8.7	1.7	2	B	H	-
SKUA-485-27-4-2	5.3	3.2	1.7	7.2	1.3	1	B	H	-
SKUA-485-27-4-6	5.0	2.3	2.1	8.2	1.6	1	B	H	-
SKUA-485-27-4-10	4.5	2.7	1.7	8.0	1.8	1	B	H	-
SKUA-485-27-4-14	5.0	2.7	1.9	8.7	1.7	0	B	H	-
SKUA-485-27-4-15	5.0	3.5	1.4	7.3	1.5	0	A	B	-
SKUA-485-27-4-19	5.5	3.2	1.7	8.3	1.5	2	B	H	-
SKUA-485-27-4-23	5.5	3.5	1.6	7.8	1.4	2	B	-	-
SKUA-485-27-4-24	5.0	3.2	1.6	8.2	1.6	1	A	-	-
SKUA-485-27-4-27	4.5	3.5	1.3	7.7	1.7	1	A	A	-
SKUA-485-27-4-32	5.5	3.2	1.7	8.0	1.5	2	B	H	-
SKUA-485-27-4-33	5.5	3.3	1.7	7.5	1.4	1	A	-	-
SKUA-485-27-4-38	4.5	3.3	1.4	8.0	1.8	2	B	B	B
SKUA-485-27-4-40	5.5	3.3	1.7	8.2	1.5	2	B	B	B
SKUA-485-27-4-50	5.5	3.3	1.7	8.2	1.5	2	A	A	-
SKUA-485-27-4-52	5.0	3.5	1.4	8.7	1.7	0	B	A	-
SKUA-485-27-4-54	5.5	3.5	1.6	8.2	1.5	0	A	-	-
SKUA-485-27-4-57	5.5	3.2	1.7	7.7	1.4	0	A	B	-
SKUA-485-27-4-58	5.5	3.3	1.7	7.9	1.4	1	A	B	-
SKUA-485-27-4-61	5.5	3.0	1.8	8.2	1.5	2	A	H	-
SKUA-485-27-4-79	5.5	3.2	1.7	8.0	1.5	1	A	H	-
SKUA-485-27-4-87	5.5	3.3	1.7	7.5	1.4	1	A	H	-
<b>Mean</b>	<b>5.22 ±0.07</b>	<b>3.20 ±0.05</b>	<b>1.64 ±0.03</b>	<b>8.00 ±0.08</b>	<b>1.54 ±0.03</b>				
<b>CV (%)</b>	<b>6.99</b>	<b>9.49</b>	<b>11.27</b>	<b>5.11</b>	<b>9.47</b>				



<b>Plant ID</b>	<b>KLBC</b>	<b>KBBC</b>	<b>LBR</b>	<b>KLAC</b>	<b>KER</b>	<b>Aroma</b>	<b>Gene status</b>		
							<i>Pita</i>	<i>Pil</i>	<i>Pi54</i>
SKUA-485-27-7-							A	B	-
SKUA-485-27-7-3	5.0	3.0	1.7	8.2	1.6	2	A	B	-
SKUA-485-27-7-5	4.8	2.0	2.4	9.2	1.9	1	A	A	-
SKUA-485-27-7-8	5.3	2.2	2.5	7.7	1.4	2	A	H	-
SKUA-485-27-7-9	4.2	2.2	1.9	7.3	1.8	1	A	B	-
SKUA-485-27-7-11	5.2	2.2	2.4	7.2	1.4	1	A	A	-
SKUA-485-27-7-12	5.0	2.5	2.0	8.2	1.6	1	A	H	-
SKUA-485-27-7-13	5.0	3.0	1.7	7.3	1.5	2	B	H	-
SKUA-485-27-7-14	4.5	2.0	2.3	7.2	1.6	1	A	A	-
SKUA-485-27-7-15	5.0	2.5	2.0	7.8	1.6	2	B	H	-
SKUA-485-27-7-17	5.5	3.0	1.8	9.2	1.7	1	B	H	-
SKUA-485-27-7-25	5.0	3.0	1.7	7.7	1.5	2	A	H	-
SKUA-485-27-7-26	5.3	3.0	1.8	8.5	1.6	2	B	A	-
SKUA-485-27-7-31	5.0	2.5	2.0	7.5	1.5	2	A	H	-
SKUA-485-27-7-33	5.0	3.0	1.7	7.8	1.6	2	A	H	-
SKUA-485-27-7-35	5.0	2.5	2.0	7.3	1.5	1	B	H	-
SKUA-485-27-7-36	5.0	3.0	1.7	7.5	1.5	2	A	A	-
SKUA-485-27-7-38	5.3	3.0	1.8	8.7	1.7	2	A	A	-
<b>Mean</b>	<b>5.00 ±0.06</b>	<b>2.62 ±0.10</b>	<b>1.95 ±0.07</b>	<b>7.89 ±0.16</b>	<b>1.58 ±0.03</b>				
<b>CV (%)</b>	<b>6.10</b>	<b>15.39</b>	<b>14.43</b>	<b>8.24</b>	<b>7.92</b>				

Plant ID	KLBC	KBBC	LBR	KLAC	KER	Aroma	Gene status		
							<i>Pita</i>	<i>Pil</i>	<i>Pi54</i>
SKUA-485-27-8-							B	A	-
SKUA-485-27-8-1	4.3	3.0	1.4	7.7	1.8	2	B	A	-
SKUA-485-27-8-3	5.0	2.5	2.0	8.3	1.7	1	B	B	B
SKUA-485-27-8-5	4.3	2.7	1.6	7.5	1.7	2	B	-	-
SKUA-485-27-8-7	4.5	2.2	2.1	7.7	1.7	1	B	A	-
SKUA-485-27-8-8	4.5	2.7	1.7	7.8	1.7	0	A	A	-
SKUA-485-27-8-9	4.7	2.7	1.8	8.3	1.8	1	B	A	-
SKUA-485-27-8-11	4.3	2.0	2.2	8.0	1.8	2	B	A	-
SKUA-485-27-8-12	5.0	3.2	1.6	8.7	1.7	0	A	A	-
SKUA-485-27-8-13	4.7	2.3	2.0	8.2	1.8	0	B	A	-
SKUA-485-27-8-28	4.7	3.0	1.6	7.7	1.6	1	A	A	-
<b>Mean</b>	<b>4.59 ±0.08</b>	<b>2.62 ±0.12</b>	<b>1.79 ±0.08</b>	<b>7.98 ±0.33</b>	<b>1.74 ±0.02</b>				
<b>CV (%)</b>	<b>5.70</b>	<b>14.42</b>	<b>14.34</b>	<b>4.77</b>	<b>3.52</b>				
<b>DHMAS 70Q 164-1b</b>	<b>6.5</b>	<b>2.6</b>	<b>2.5</b>	<b>10.3</b>	<b>1.58</b>	<b>0</b>			
<i>Mushk Budji</i>	<b>5.1</b>	<b>3.2</b>	<b>1.6</b>	<b>7.5</b>	<b>1.47</b>	<b>2</b>			

KLBC: Kernel Length Before Cooking (mm), KBBC: Kernel Breadth Before Cooking, LBR: Length Breadth Ratio, KLAC: Kernel Length After Cooking (mm), KER: Kernel Elongation Ratio, Aroma: (0-2 scale), A: Recipient parent allele, B: Donor Parent allele

**Supplementary Table S9. Fold-change in protein expression under 2D gel electrophoresis of three-gene pyramided as compared to donor line DHMAS 70Q 164-1b**

<b>Protein Name</b>	<b>Match ID</b>	<b>Max</b>	<b>Fold</b>	<b>Match Count</b>	<b>Mushk Budji</b>	<b>SKUA-485-27-4-38-4</b>	<b>SKUA-485-27-4-40-6</b>	<b>DHMAS 70Q 164-1b</b>	<b>ANOVA</b>
Alpha-amylase	33	0.75007	1.82084	4	0.75007	0.70812	0.74073	0.41193	0.00467
Triosephosphate isomerase	47	1.41549	16.53680	4	0.30501	0.30613	1.41549	0.08560	0.00009
19 kDa globulin	109	0.80443	8.06367	4	0.42705	0.29868	0.80443	0.09976	0.00249
S-(+)-linalool synthase	133	0.50076	1.81634	3	0.50076	0.33239	0.27570	-	0.00000

**Supplementary Table S10. Grain yield performance of pyramided lines across different locations of Kashmir valley**

S. No.	Line ID	Grain yield (t/ha) (GY)					
		E <sub>1</sub>	E <sub>2</sub>	E <sub>3</sub>	E <sub>4</sub>	E <sub>5</sub>	Mean
1	SKUA-485-27-50-5-5	3.23	3.02	2.98	2.74	2.81	2.96±0.09
2	SKUA-485-27-20-6-4	5.13	4.68	4.12	3.74	3.03	4.14±0.36
3	SKUA-485-27-13-1-3	3.85	3.52	2.98	3.33	2.86	3.31±0.18
4	SKUA-485-27-86-10-4	5.95	4.93	4.63	4.38	4.40	4.86±0.29
5	SKUA-485-27-77-6-2	5.61	5.12	4.62	4.25	4.16	4.75±0.27
6	SKUA-485-27-47-4-1	4.21	5.34	5.21	4.61	4.82	4.84±0.20
7	SKUA-485-27-3-7-5	5.34	5.26	4.38	4.13	3.00	4.42±0.43
8	SKUA-485-27-4-38-4	5.51	5.56	5.24	4.20	3.33	4.77±0.44
9	SKUA-485-27-4-40-6	5.62	5.40	4.70	4.54	3.89	4.83±0.31
10	Mushk Budji	5.12	4.89	4.38	3.85	3.42	4.33±0.32
11	DHMAS 70Q 164-1b	1.62	1.85	2.11	2.58	2.45	2.12±0.18
	CD (P<0.05)	1.45	1.28	1.20	0.95	1.05	-
	Coefficient of variation (%)	8.89	8.28	5.85	6.50	7.53	-

**Supplementary Table S11. Agronomic performance of pyramided lines for days to flowering and primary yield attributes under different locations within Kashmir valley**

S. No.	Line ID	Number of effective tillers per plant (NT)						Spikelets per panicle (SP)					
		E <sub>1</sub>	E <sub>2</sub>	E <sub>3</sub>	E <sub>4</sub>	E <sub>5</sub>	Mean	E <sub>1</sub>	E <sub>2</sub>	E <sub>3</sub>	E <sub>4</sub>	E <sub>5</sub>	Mean
1	SKUA-485-27-50-5-5	10.25	11.12	11.56	10.84	10.12	10.78±0.27	131.30	113.16	107.41	101.11	115.69	113.73±5.06
2	SKUA-485-27-20-6-4	14.50	13.87	13.58	13.21	12.58	13.55±0.32	141.52	140.59	121.35	113.25	96.34	122.61±8.54
3	SKUA-485-27-13-1-3	12.50	13.14	12.85	12.34	11.86	12.54±0.22	128.33	107.15	92.76	112.44	100.48	108.23±6.01
4	SKUA-485-27-86-10-4	15.21	15.10	15.34	14.35	13.87	14.77±0.28	163.00	130.60	125.76	122.09	126.89	133.67±7.46
5	SKUA-485-27-77-6-2	14.96	14.57	14.15	13.24	13.56	14.10±0.32	156.25	146.42	130.60	133.75	122.71	137.95±5.96
6	SKUA-485-27-47-4-1	16.83	17.14	16.38	16.85	15.23	16.49±0.34	100.04	124.62	132.53	114.00	131.59	120.56±6.11
7	SKUA-485-27-3-7-5	14.00	14.23	14.28	13.85	13.69	14.01±0.11	158.93	147.86	127.80	124.25	91.31	130.03±11.60
8	SKUA-485-27-4-38-4	14.67	15.20	14.14	14.52	14.24	14.55±0.19	150.24	152.41	132.96	115.70	93.54	128.97±11.07
9	SKUA-485-27-4-40-6	15.24	14.95	13.85	14.64	13.23	14.38±0.37	147.51	150.50	151.34	124.04	122.51	139.18±6.53
10	Mushk Budji	14.18	14.34	13.26	12.85	12.50	13.43±0.36	144.43	136.40	132.13	119.84	114.00	129.36±5.53
11	DHMAS 70Q 164-1b	10.23	10.15	11.52	10.25	11.89	10.81±0.37	87.98	101.26	101.76	132.48	108.45	106.38±7.32
	CD (P<0.05)	2.49	2.17	1.84	2.24	1.98	-	25.97	22.15	22.20	12.38	20.83	-
	Coefficient of variation (%)	8.12	9.51	6.52	5.14	7.31	-	6.23	8.12	5.44	6.20	7.58	-

Contd..

S. No.	Line ID	1000-seed weight (SW)						Days to 50% flowering					
		E <sub>1</sub>	E <sub>2</sub>	E <sub>3</sub>	E <sub>4</sub>	E <sub>5</sub>	Mean	E <sub>1</sub>	E <sub>2</sub>	E <sub>3</sub>	E <sub>4</sub>	E <sub>5</sub>	Mean
1	SKUA-485-27-50-5-5	24.59	24.61	24.32	25.67	24.96	24.83±0.23	100.2	108.5	92.8	95.8	89.2	97.3±3.33
2	SKUA-485-27-20-6-4	25.41	24.88	25.37	25.60	25.60	25.37±0.13	95.3	97.2	80.6	83.4	80.3	87.4±3.68
3	SKUA-485-27-13-1-3	24.40	25.12	25.41	24.85	24.30	24.82±0.21	102.5	100.5	89.2	94.5	88.1	95.0±2.90
4	SKUA-485-27-86-10-4	24.14	25.58	24.25	25.79	25.41	25.03±0.35	96.5	93.4	81.6	85.7	84.1	88.3±2.85
5	SKUA-485-27-77-6-2	24.61	24.15	25.27	24.59	25.78	24.88±0.29	96.2	99.2	83.1	82.2	78.8	87.9±4.09
6	SKUA-485-27-47-4-1	25.21	25.41	24.65	24.63	24.78	24.94±0.16	93.1	99.1	81.4	84.7	80.4	87.7±3.61
7	SKUA-485-27-3-7-5	24.20	25.81	24.27	24.36	24.83	24.69±0.30	90.4	96.2	82.8	79.5	75.2	84.8±3.78
8	SKUA-485-27-4-38-4	25.44	24.95	25.82	25.49	25.63	25.47±0.14	93.5	97.0	85.1	83.6	79.4	87.7±3.26
9	SKUA-485-27-4-40-6	25.42	24.30	25.51	25.67	24.53	25.09±0.28	97.2	101.2	87.8	85.2	80.7	90.4±3.81
10	Mushk Budji	25.20	25.58	25.50	25.30	24.26	25.17±0.24	95.4	100.4	85.2	85.3	80.7	89.4±3.65
11	DHMAS 70Q 164-1b	18.59	18.91	18.32	19.11	19.60	18.91±0.22	120.3	125.5	115.8	113.8	110.1	117.1±2.67
	CD (P<0.05)	0.74	0.79	0.84	0.75	0.79	-	5.21	4.95	6.88	5.50	4.82	-
	Coefficient of variation (%)	3.12	4.64	2.58	2.90	3.33	-	3.82	5.65	4.48	6.30	7.21	-

**Supplementary Table S12. Physico-chemical and cooking quality traits of pyramided lines**

Line ID	Plant ID	KLBC (mm)	LBR	KLAC (mm)	KER	GC	AC (%)	Hulling (%)	Milling (%)	ASV	Aroma (0-2 scale)
1	SKUA-485-27-50-5-5	4.89±0.08	1.82±0.02	8.18±0.12	1.67±0.03	92±4.12	15.21±0.90	80.46±2.33	70.77±3.10	4	1
2	SKUA-485-27-20-6-4	5.34±0.07	1.77±0.03	8.21±0.11	1.54±0.02	95±5.55	18.12±1.12	84.54±3.14	74.32±3.67	4	2
3	SKUA-485-27-13-1-3	5.45±0.07	1.80±0.04	8.41±0.09	1.54±0.02	96±6.28	17.45±0.85	83.15±1.87	73.15±3.15	4	2
4	SKUA-485-27-86-10-4	5.33±0.08	1.75±0.02	8.39±0.10	1.57±0.03	93±5.80	17.66±0.95	86.15±2.45	76.89±2.95	4	2
5	SKUA-485-27-77-6-2	5.52±0.10	1.75±0.02	8.43±0.12	1.53±0.04	98±4.15	19.35±1.02	74.62±3.66	74.42±3.11	4	2
6	SKUA-485-27-47-4-1	5.13±0.07	1.85±0.03	7.88±0.11	1.54±0.03	95±6.32	16.82±1.20	78.12±3.50	69.10±2.74	4	2
7	SKUA-485-27-3-7-5	5.11±0.08	1.72±0.02	8.31±0.10	1.63±0.02	93±3.19	17.71±0.82	86.24±2.94	78.12±3.68	4	2
8	SKUA-485-27-4-38-4	5.51±0.10	1.63±0.02	8.11±0.08	1.47±0.02	97±4.66	18.45±0.90	84.52±4.45	76.89±4.00	5	2
9	SKUA-485-27-4-40-6	5.5±0.09	1.70±0.04	8.26±0.10	1.50±0.03	97±5.87	18.91±0.94	85.61±3.77	75.32±3.45	5	2
10	<i>Mushk Budji</i>	5.45±0.08	1.65±0.03	8.13±0.11	1.49±0.02	115±6.30	14.14±1.05	86.25±4.66	78.25±3.10	4	2
11	DHMAS 70Q 164-1b	6.53±0.08	2.64±0.03	10.52±0.14	1.61±0.03	55±3.21	21.52±0.88	82.23±3.58	70.33±2.82	6	0
	CD (P<0.05)	0.14	0.05	0.11	0.04	4.42	1.09	2.81	2.05		
	Coefficient of variation (%)	3.12	2.45	3.34	2.56	2.66	4.18	5.64	5.28		

**Supplementary Table S13. Disease reaction under uniform blast nursery across five hot spot locations**

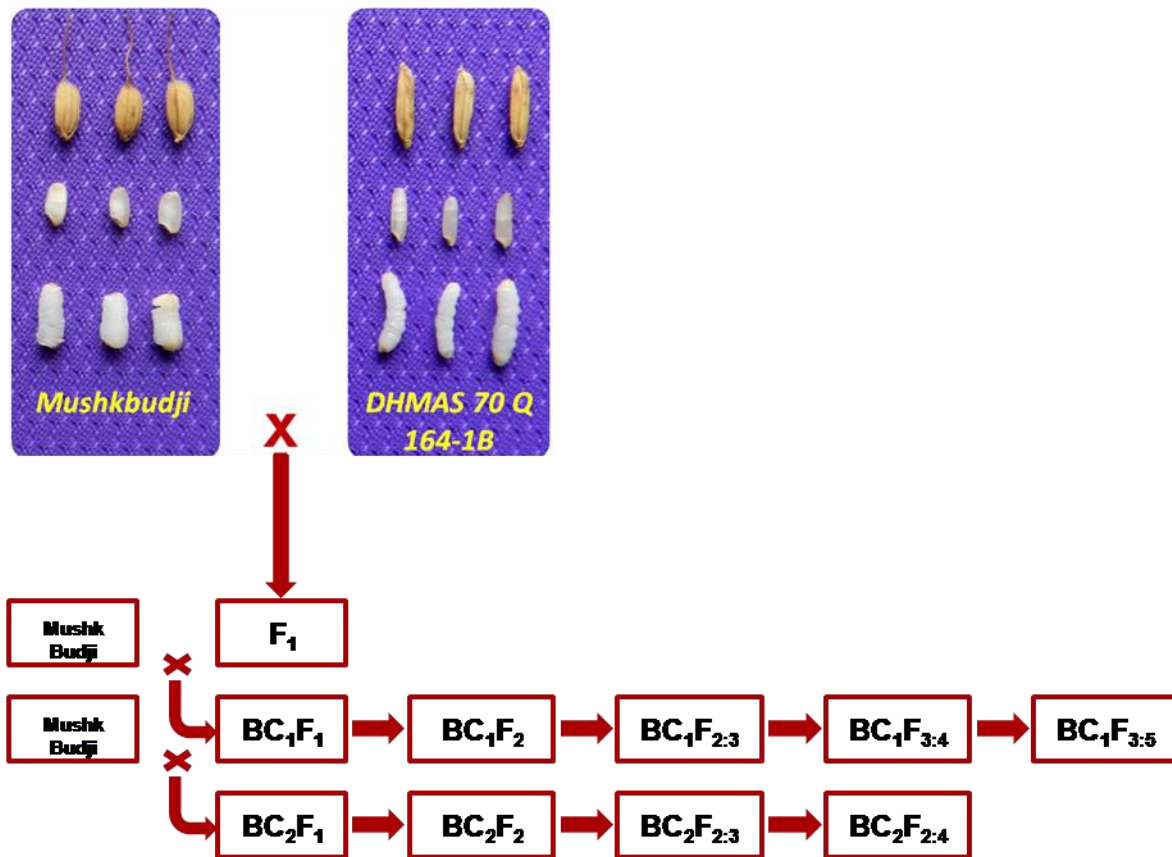
S. No.	Plant ID	Gene combination	Leaf blast reaction				
			Sagam	Pombay	Khudwani	Shalimar	Budgam
1	SKUA-485-27-50-5-5	<i>Pi54+Pi1+Pita</i>	5	3	4	5	2
2	SKUA-485-27-20-6-4	<i>Pi54+Pi1+Pita</i>	1	0	0	0	0
3	SKUA-485-27-13-1-3	<i>Pi54+Pi1+Pita</i>	3	1	2	0	2
4	SKUA-485-27-86-10-4	<i>Pi54+Pi1+Pita</i>	1	0	0	0	0
5	SKUA-485-27-77-6-2	<i>Pi54+Pi1+Pita</i>	1	0	0	0	1
6	SKUA-485-27-47-4-1	<i>Pi54+Pi1</i>	1	2	0	1	2
7	SKUA-485-27-3-7-5	<i>Pi54+Pi1+Pita</i>	1	0	0	0	0
8	SKUA-485-27-4-38-4	<i>Pi54+Pi1+Pita</i>	1	0	0	0	0
9	SKUA-485-27-4-40-6	<i>Pi54+Pi1+Pita</i>	1	1	0	1	0
10	Mushk Budji		9	5	8	7	8
11	DHMAS 70Q 164-1b	<i>Pi54+Pi1+Pita</i>	1	0	0	0	0

Field reaction scoring was carried out on 0-9 scale as per SES IRRI (1996); Score 0-3: R; 4-5: MR; 6-7: MS; 8-9: S

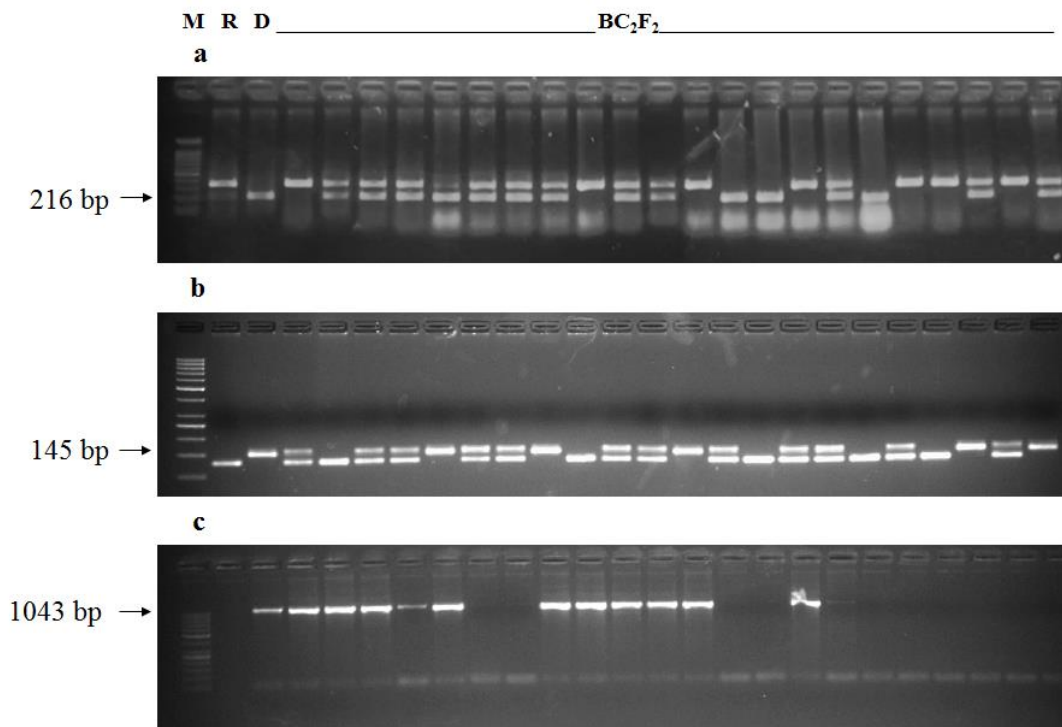


**Supplementary Table S14: Primer sequence of markers used for foreground selection**

Gene	Marker name	Forward / Reverse	Primer sequence	Chromosome	Linkage distance	Ref
<i>Pi54</i>	<i>Pi54</i> MAS	F	5'-CAATCTCCAAAGTTTTTCAGG-3'	11	Gene based	42
		R	5'-GCTTCAATCACTGCTAGACC-3'			
<i>Pil</i>	RM224	F	5'-ATCGATCGATCTTCACGAGG-3'	11	0.0 cM	43
		R	5'-TGCTATAAAAGGCATTCGGG-3'			
<i>Pita</i>	YL155/87	F	5'-AGCAGGTTATAAGCTAGGCC-3'	12	Gene based	44
		R	5'-CTACCAACAAGTTCATCAAA-3'			
	YL155/83	F	5'-CAACAATTTAATCATACACG-3'			
		R	5'-ATGACACCCTGCGATGCAA-3'			

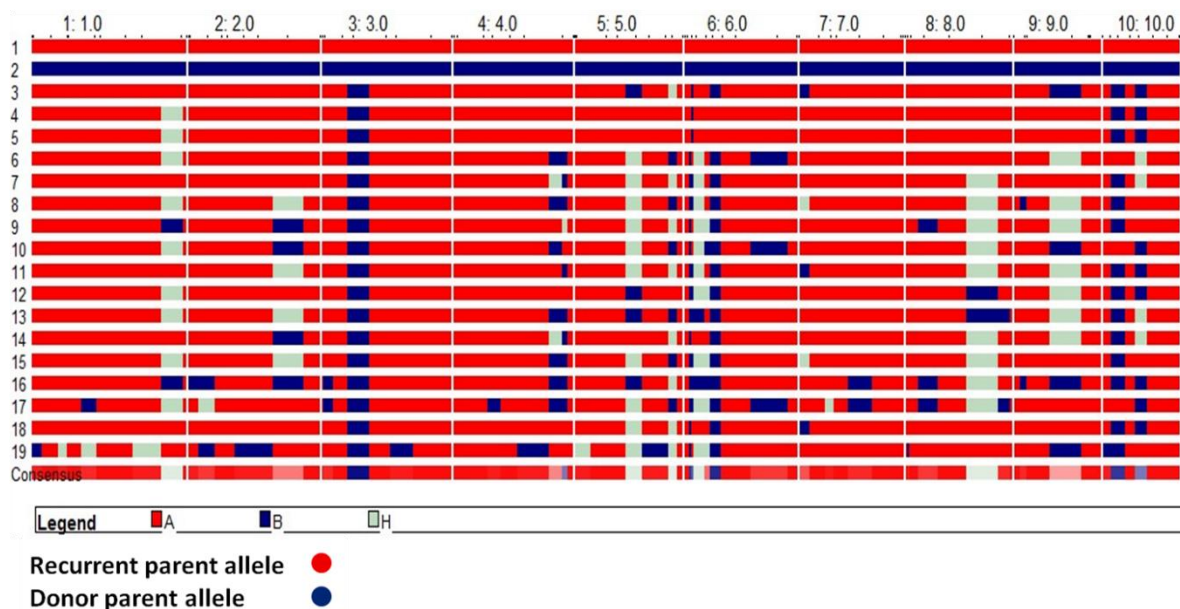


**Supplementary Fig. S1: Marker-assisted backcross breeding scheme adopted for transfer of genes *Pi54+Pi1+Pita*.** Seventeen BC<sub>1</sub>F<sub>1</sub> plants were generated. Marker-assisted foreground analysis (FG) helped to identify plants carrying following gene combinations: *Pi54+Pita+Pi1* (SKAU-485-27)=1; *Pi54+Pi1*= 6; *Pi54*= 3; *Pi1*= 6; Recessive=1; 234 BC<sub>2</sub>F<sub>1</sub> plants were produced; 45 of which came from backcrossing of single three-gene heterozygote namely, SKAU-485-27; FG helped to select the plants carrying: *Pi54+Pi1+Pita*=2; *Pi54+Pi1*= 13; *Pi54*= 5; *Pi1*= 5; *Pita*=10; recessive alleles= 3; and four were not harvested; 789 BC<sub>1</sub>F<sub>2</sub> plants were harvested of which 86 analyzed were obtained from selfing of single three-gene heterozygote (SKAU-485-27). FG of 86 plants revealed: *Pi54+Pi1+Pita*=2; *Pi54+Pi1*= 10; *Pi54+Pita*= 1; *Pi1+Pita*= 1; 49 BC<sub>2</sub>F<sub>2</sub> plants were put to FG out of plants obtained from selfing of two triple-heterozygotes. These yielded *Pi54+Pi1+Pita*=3; *Pi1*= 8; *Pita*= 23; 14 BC<sub>1</sub>F<sub>2:3</sub> families (two from two 3-gene pyramids) comprising 1400 plants were grown of which 104 selected; 3 BC<sub>2</sub>F<sub>2:3</sub> families (from three 3-gene pyramids) comprising 1500 plants were grown; 30 single plants selections (SPS) made per family and bulked; Nine BC<sub>1</sub>F<sub>3:4</sub> SPS grown and harvested in bulk; Three BC<sub>2</sub>F<sub>2:3</sub> pyramided lines grown across five locations; Nine BC<sub>1</sub>F<sub>3:5</sub> pyramided lines grown across five locations.

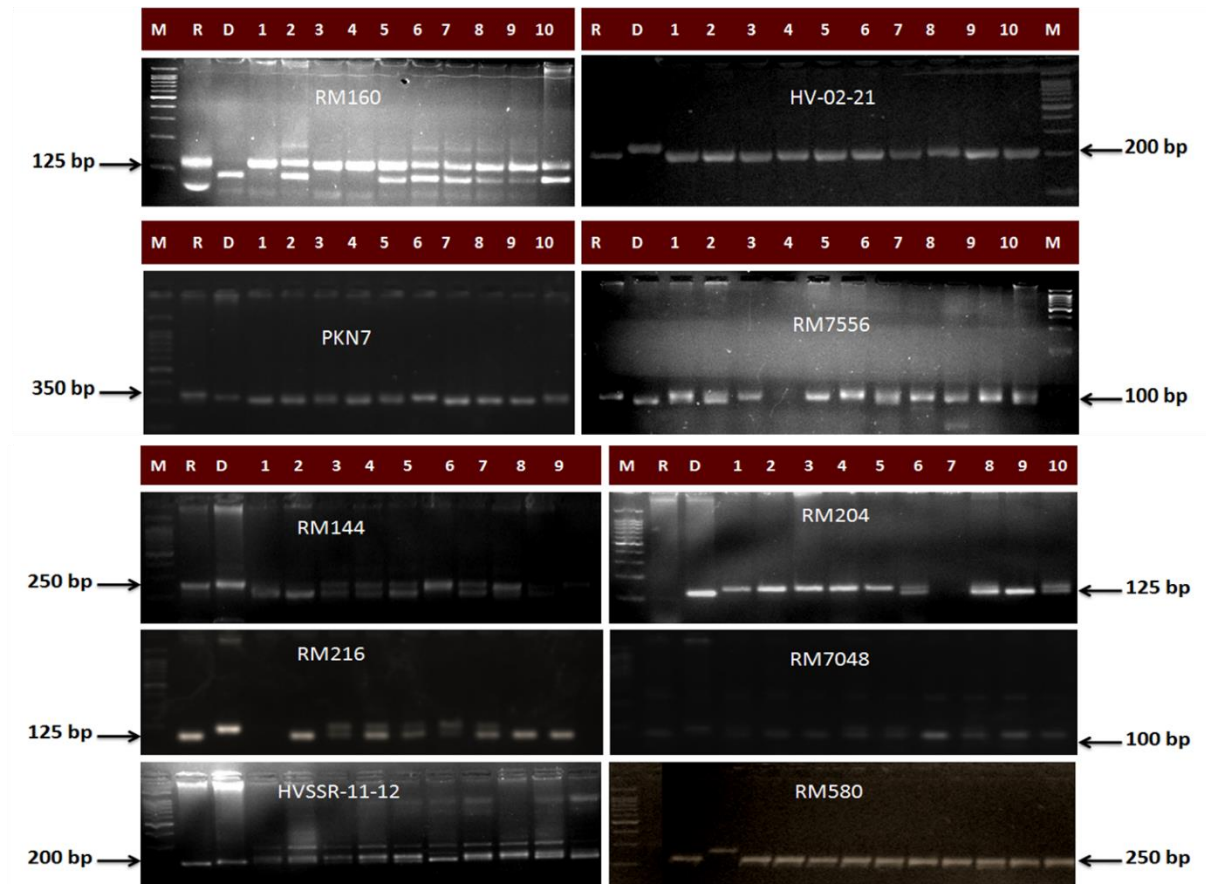


**Supplementary Fig. S2: Foreground selection in BC<sub>2</sub>F<sub>2</sub> for the genes *Pi54*, *Pi1* and *Pita***

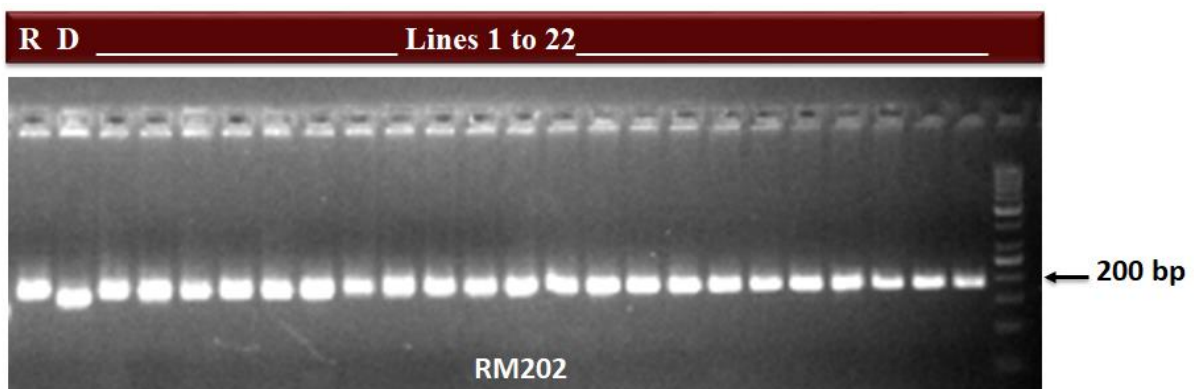
a: InDel marker *Pi54* MAS; b: SSR marker RM224; c: SNP based dominant marker YL155/87; Lanes M: 50bp size standard (Fermentas, Lithuania, U.S.); R: Mushk Budji; D: DHMAS 70Q 164-1b; Lanes 1-22: BC<sub>2</sub>F<sub>2</sub> single plant selections from three-gene BC<sub>2</sub>F<sub>1</sub>. Lane 7: Plant# SKUA-485-27-4 homozygous for three genes (*Pi54*+*Pi1*+*Pita*). (Refer Supplementary Fig. S12-14)



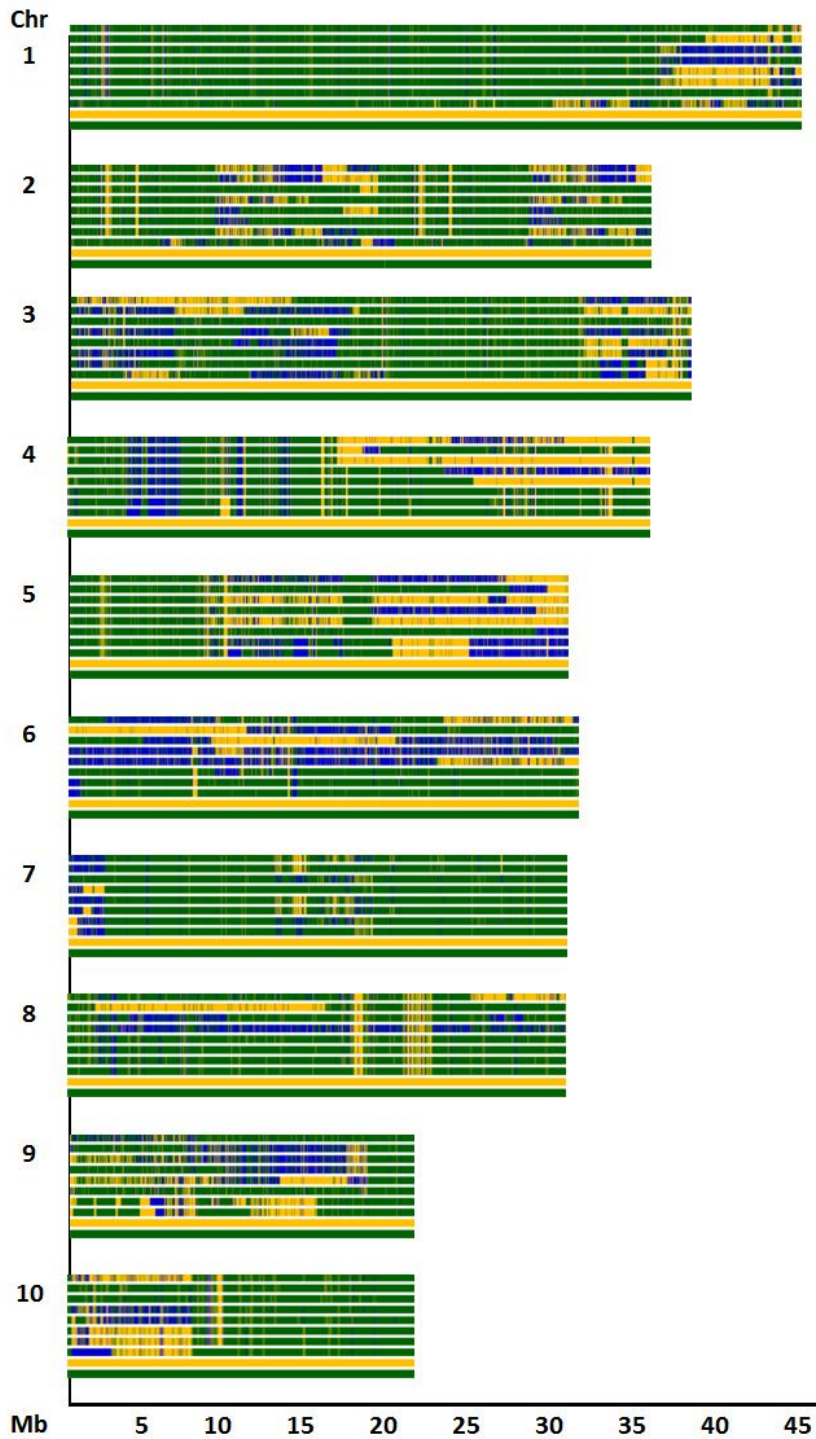
**Supplementary Fig. S3: Graphical genotype of marker-assisted background selection (on non-carrier chromosomes) of pyramided lines carrying blast resistance genes *Pi54*, *Pi1* and *Pita*.** Bar1: Mushk Budji; Bar 2: DHMAS 70Q 164-1b; Bar 3-19: Backcross derived lines.



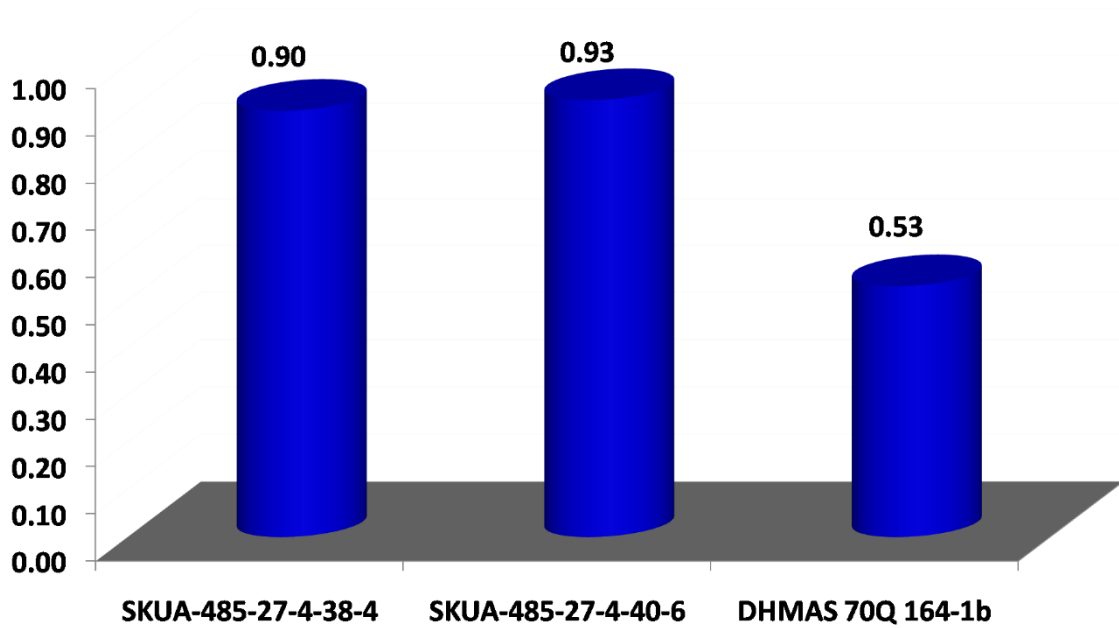
**Supplementary Fig. S4: Gel image depicting recurrent parent genome recovery of pyramided lines carrying blast resistance genes *Pi54*, *Pi1* and *Pita*.** R: Mushk Budji; D: DHMAS 70Q 164-1b; Lane 1-10: Backcross derived lines; M: 50 bp size standard (Fermentas, Luthuania, U S).



**Supplementary Fig. S5: Gel image depicting recurrent parent genome recovery of pyramided lines.** R: Mushk Budji; D: DHMAS 70Q 164-1b; Lane 1-22: Backcross derived lines; M: 50 bp size standard (Fermentas, Luthuania, U S).



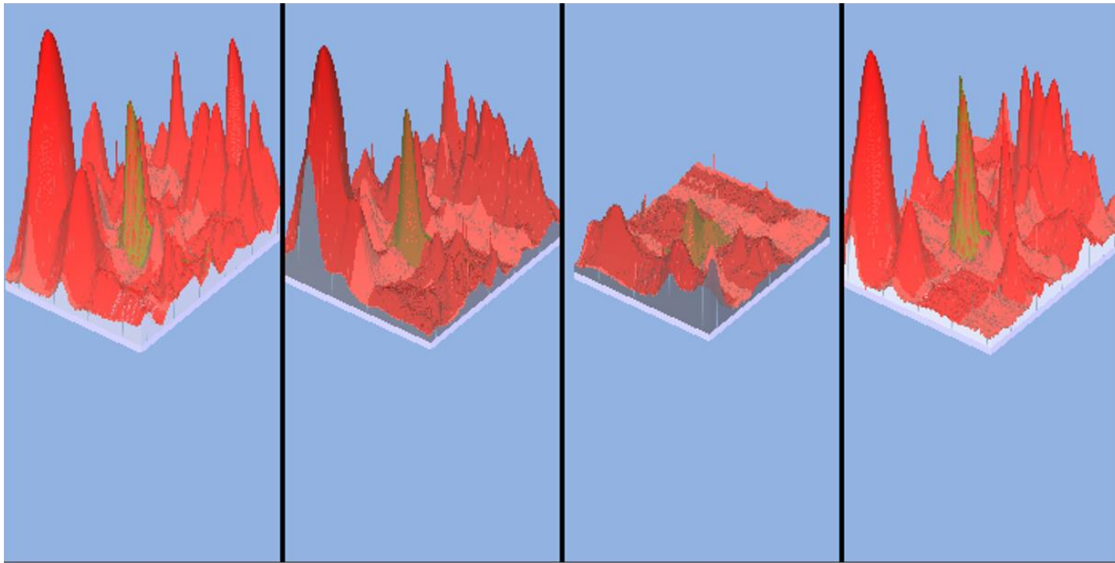
**Supplementary Fig. S6: RPG recovery of pyramided lines based on ‘OsSNPnks’ 50K Axiom® 2.0 SNP array for non-carrier chromosomes.** Bar number 1-10: Mushk Budji; DHMAS 70Q 164-1b; SKUA-485-27-4-38-4; SKUA-485-27-4-40-6; SKUA-485-27-3-7-5; SKUA-485-27-13-1-3; SKUA-485-27-20-6-4; SKUA-485-27-47-4-1; SKUA-485-27-77-6-2; SKUA-485-27-86-10-4; Yellow: Recurrent parent allele; Green: Donor allele; Blue: Heterozygous allele; x-axis represents the Mb position of respective chromosomes, 1 to 10.



**Supplementary Fig. S7: Protein match score of pyramided lines and donor with respect to recurrent parent in 2D-Gel electrophoresis.** SKUA-485-27-4-38-4 and SKUA-485-27-4-40-6 share 90 and 93% of protein identity with RP *Mushk Budji* as compared to donor DHMAS 70Q 164-1b that shows only 53% similarity.

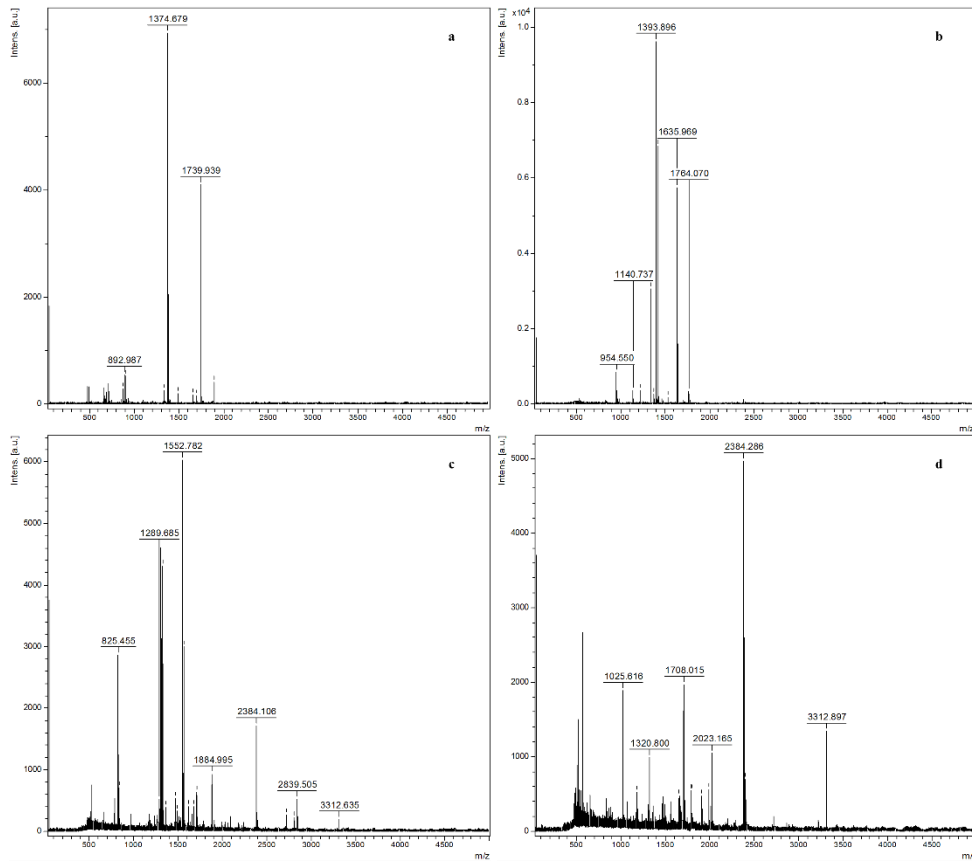


SKUA-485-27-4-40-6   SKUA-485-27-4-38-4   DHMAS 70Q 164-1b   Mushk Budji



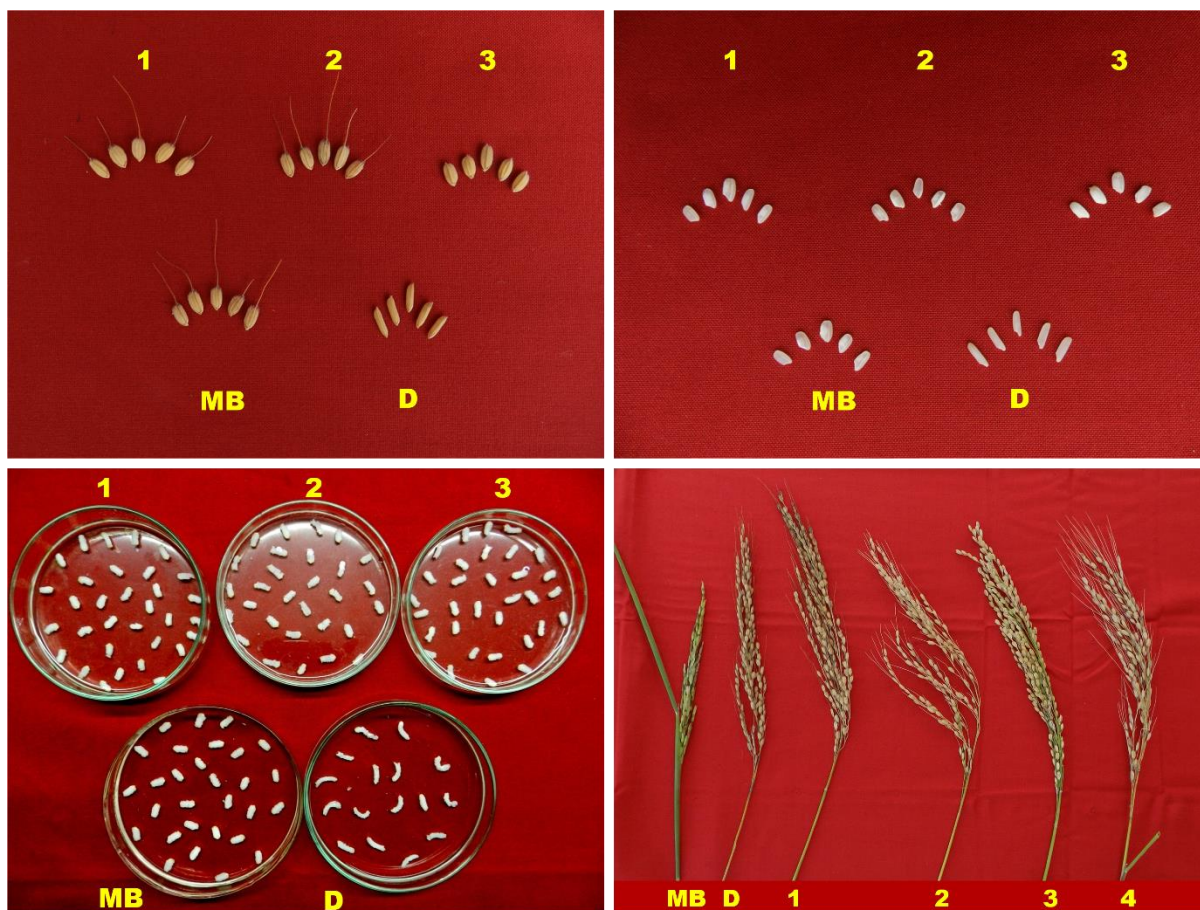
Protein	Match ID	Fold	Match Count	Mushk Budji	SKUA-485-27-4-38-4	SKUA-485-27-4-40-6	DHMAS 70Q 164-1b	ANOVA
Alpha-amylase	33	3.60399	4	0.75007	0.70812	0.74073	0.41193	0.00467

**Supplementary Fig. S8: Fold change in protein expression of pyramided lines and RP in comparison to donor line for Alpha-amylase**



**Supplementary Fig. S9: MALDI-TOF analysis of spots in recipient parent *Mushk Budji* / donor DHMAS 70Q 164-1b.** a: Alpha-amylase; b: Trioisophosphate isomerase; c: 19 kDa globulin; d: S-(+)-linalool synthase.

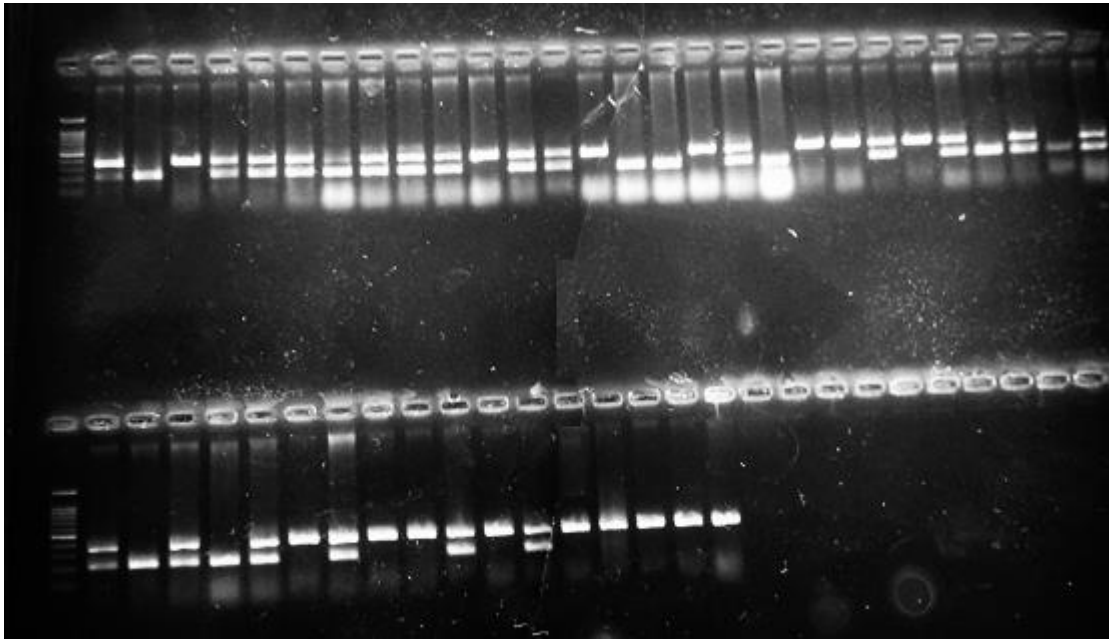




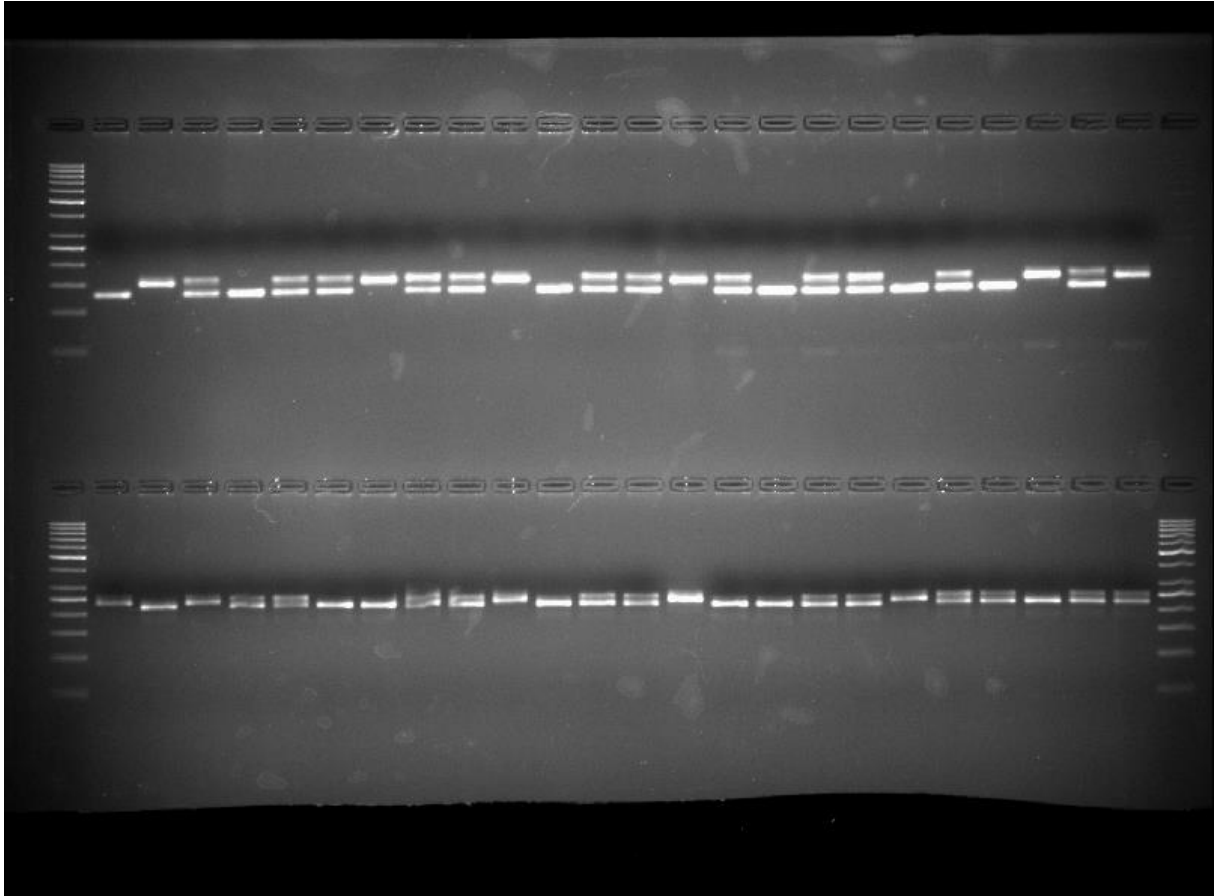
**Supplementary Fig. S10: Recovery in grain type, kernel features, cooking quality and panicle attribute of pyramided lines.** MB: Mushk Budji; D: DHMAS 70Q 164-1b; 1: SKUA-485-27-4-38-4; 2: SKUA-485-27-4-40-6; 3: SKUA-485-27-20-6-4; 4: SKUA-485-27-3-7-5.



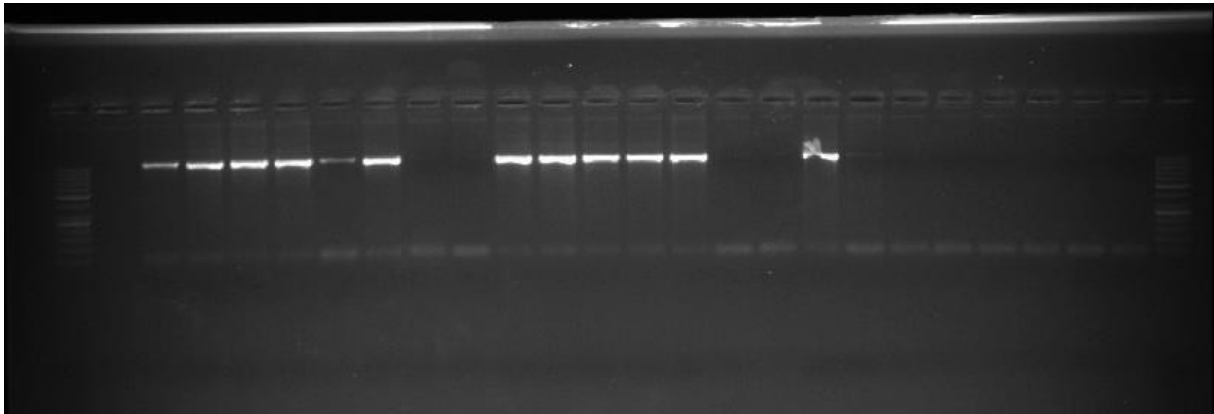
**Supplementary Fig. S11: Morphological features of recurrent parent Mushk Budji.** a: Panicle and grain type; b: Plant architecture; c: Mushk Budji at early seedling stage showing heavy blast incidence on leaves; d: Cooked rice.



**Supplementary Fig. S12:** Foreground selection in  $BC_2F_2$  for blast resistance gene *Pi54* using InDel marker Pi54 MAS.



**Supplementary Fig. S13: Foreground selection in BC<sub>2</sub>F<sub>2</sub> for blast resistance gene *Pi1* (above panel) using gene linked marker RM224.**



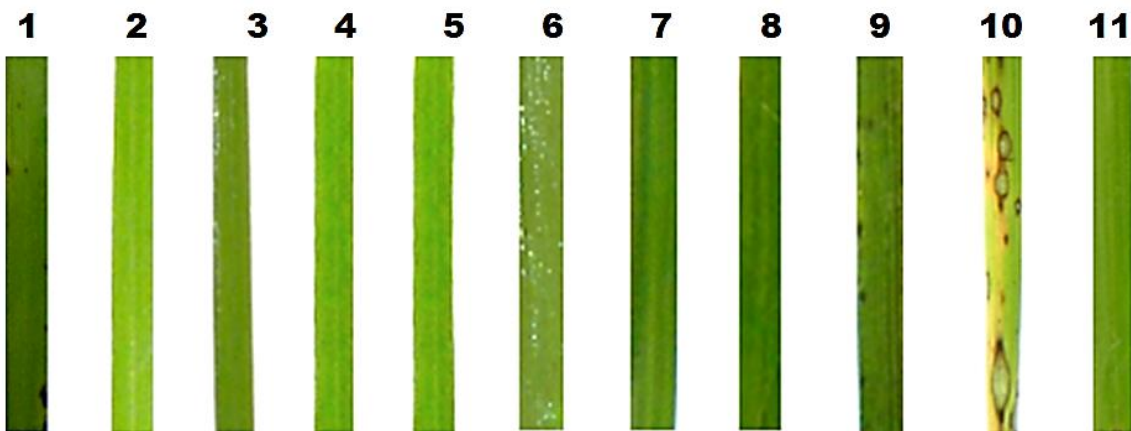
**Supplementary Fig. S14: Foreground selection in BC<sub>2</sub>F<sub>2</sub> for blast resistance gene *Pita* using SNP based dominant marker YL155/87.**



Mushk Buji      SKUA-485-27-13-1-3      Mushk Budji      DHMAS 70Q 164-1b      SKUA-485-27-4-40-6



**Supplementary Fig. S15: The reaction of pyramided lines to isolate Mo-ei-MBI-2.** Arrow heads point at blast lesions.



**Supplementary Fig. S16: The reaction of pyramided lines to isolate Mo-nwi-kash-32.**

Sequence of pyramided lines screened under controlled conditions: 1: SKUA-485-27-50-5-5 (1); 2: SKUA-485-27-20-6-4 (0); 3: SKUA-485-27-13-1-3 (0); 4: SKUA-485-27-86-10-4 (0); 5: SKUA-485-27-77-6-2 (0); 6: SKUA-485-27-47-4-1 (0); 7: SKUA-485-27-3-7-5 (0); 8: SKUA-485-27-4-38-4 (0); 9: SKUA-485-27-4-40-6 (1); 10: Mushk Budji (5); 11: DHMAS 70Q 164-1b (0). The values in parenthesis indicate blast score as defined in Table 3.



**Supplementary Fig. S17: The reaction of pyramided lines to isolate SKUA-Mo-3.** Sequence of pyramided lines screened under controlled conditions: 1: Mushk Budji; 2: SKUA-485-27-50-5-5; 3: SKUA-485-27-20-6-4; 4: SKUA-485-27-13-1-3; 5: SKUA-485-27-86-10-4; 6: SKUA-485-27-77-6-2; 7: SKUA-485-27-47-4-1; 8: SKUA-485-27-3-7-5; 9: SKUA-485-27-4-38-4; 10: SKUA-485-27-4-40-6. Mushk Budji was also planted as a border row as demarcated by a line; Arrow heads indicate Mushk Budji line showing susceptible reaction.





**Supplementary Fig. S18: The reaction of pyramided lines to isolate SKUA-Mo-9.** Sequence of pyramided lines screened under controlled conditions: 1: SKUA-485-27-50-5-5; 2: Mushk Budji; 3: SKUA-485-27-4-38-4. Arrow marks point at blast lesions.