

Table S1. Agricultural practice in study fields

RBS-1 and 2					BSR-1 and 2				
Site (Crop)	Cultivar	Year	Date	Agricultural practice	Site (Crop)	Cultivar	Year	Date	Agricultural practice
Margin	-	2016	Late Mar.	Levee plastering	Margin	-	2016	Jun. 8	Herbicide A
			Jun. 29	Mowing and herbicide A <sup>a</sup>				Jun. 29	Herbicide A
			Jul. 30	Herbicide A				Jul. 30	Herbicide A
			Oct. 10	Herbicide A				Sep. 2	Herbicide A
		2017	Jun. 22	Herbicide A			2017	Late Mar.	Levee plastering
			Aug. 9	Herbicide A				Jul. 19	Herbicide A
							Aug. 5	Herbicide A	
							Oct. 11	Mowing	
Field (Rice)	Koshihikari	2016	Late Apr.	Puddling with a harrow	Field (Barley)	Kashimamugi	2015	Dec. 6	Sowing and herbicide E <sup>c</sup>
			Apr. 27	Transplanting and herbicide B <sup>b</sup>				2016	May 30
			Sep. 3	Harvest					Late Jun. to early Jul.
			Early Nov.	Tillage (Chisel ploughing)			2016	Jul. 3	Sowing and herbicide C
Middle Nov. to late Dec.	Tillage (Rotary, two times)	Field (soybean)	Natto-Shoryu	Jul. 18	Herbicide D				
Field (Barley)	Kashimamugi	2017	Jan. 5	Sowing			2016 to 2017	Jul. 28	Intertillage (cultivator and rake)
			Jun. 9	Harvest			2016 to 2017	Aug. 3 and Aug. 8	Intertillage and earthing-up
			Late Jun. to early Jul.	Tillage (Rotary, two times)			2016 to 2017	Dec. 15	Harvest
Field (Soybean)	Natto-Shoryu	2017	Jul. 4	Sowing and herbicide C <sup>c</sup>	Field (Rice)	Himagonomi	2017	Late Dec. to late Feb.	Tillage (Rotary, two times)
			Jul. 14	Intertillage				Late Apr.	Puddling with a harrow
			Jul. 20	Herbicide D <sup>d</sup>				Apr. 30 (BSR-1) or May 5 (BSR-2)	Transplanting and herbicide B
			Jul. 28	Intertillage and earthing-up				Sep. 4 (BSR-1) or Oct. 3 (BSR-2)	Harvest
			Nov. 30	Harvest				Middle Oct. to middle Nov.	Tillage (Chisel ploughing)
							Late Nov. to early Dec.	Tillage (Rotary, two times)	
							2017	Early Dec.	Sowing and herbicide E
									Field (Barley)

a: Herbicide A shows foliage application of glyphosate potassium salt solution; b: Herbicide B shows foliage and soil application of the combination product of ipfencarbazone, bromobutide, and bensulfuron methyl; c: Herbicide shows soil application of the combination product of alachlor and linuron; d: Herbicide D shows foliage application of bentazon; e: Herbicide E shows soil application of the combination product of pendimethalin and linuron; RBS-1: rice- barley-soybean-1; RBS-2: rice- barley-soybean-2; BSR-1: barley-soybean-rice-1; BSR-2: barley-soybean-rice-2. Information on the herbicides is listed in Table S2. Row-spacing widths of rice, barley and soybeans were 30 cm, 17 cm and 60 cm, respectively. Fertilizers were added to the soil surface before transplantation or sowing, as follows: N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O: 5-2-1, 3.0 kg ha<sup>-1</sup>; N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O: 14-14-14, 7.0 kg ha<sup>-1</sup>; N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O: 14-14-14, 6.0 kg ha<sup>-1</sup> for rice, barley, and soybeans, respectively