Supplementary Materials

Table S1. Economic analysis of sequential PRE and POST herbicide applications in comparison with sole applications of PRE and POST herbicides in 2012.

Herbicide treatment	Soybean yield (Y, t ha^{-1})	Unit price (P, $ t^{-1})	Gross revenue ($ ha^{-1})	Herbicide cost (H, $ ha^{-1})	Application cost (A, $ ha^{-1})	Economic return (ER, $ ha^{-1})
Untreated control	0.03	470	14.1	0.0	0.0	14.1
Dimethenamid-P (PRE)	0.07	470	32.9	23.2	6.1	3.5
Acetochlor (PRE)	0.51	470	239.7	24.2	6.1	209.4
Bentazon+acifluorfen (POST) at 30 DAS	0.74	470	347.8	33.3	6.1	308.4
Bentazon+acifluorfen (POST) at 60 DAS	0.73	470	343.1	33.3	6.1	303.7
Bentazon (POST) at 30 DAS	0.28	470	131.6	5.1	6.1	120.3
Bentazon (POST) at 60 DAS	0.26	470	122.2	5.1	6.1	110.9
Quizalofop (POST) at 30 DAS	0.004	470	1.88	19.7	6.1	-23.9
Quizalofop (POST) at 60 DAS	0.10	470	47.0	19.7	6.1	21.2
Dimethenamid-P fb. bentazon+acifluorfen (POST) at 30 DAS	0.91	470	427.7	56.5	12.3	358.9
Dimethenamid-P fb. bentazon+acifluorfen (POST) at 60 DAS	1.02	470	479.4	56.5	12.3	410.6
Dimethenamid-P fb. bentazon+quizalofop (POST) at 30 DAS	0.72	470	338.4	48.0	12.3	278.1
Dimethenamid-P fb. bentazon+quizalofop (POST) at 60 DAS	0.13	470	61.1	48.0	12.3	0.8
Acetochlor (PRE) fb. bentazon+acifluorfen (POST) at 30 DAS	1.69	470	794.3	57.5	12.3	724.5
Acetochlor (PRE) fb. bentazon+acifluorfen (POST) at 60 DAS	1.69	470	794.3	57.5	12.3	724.5
Acetochlor (PRE) fb. bentazon+quizalofop (POST) at 30 DAS	1.10	470	517.0	49.0	12.3	455.7
Acetochlor (PRE) fb. bentazon+quizalofop (POST) at 60 DAS	0.68	470	319.6	49.0	12.3	258.3

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Table S2. Economic analysis of sequential PRE and POST herbicide applications in comparison with sole applications of PRE and POST herbicides in 2013.

Herbicide treatment	Soybean yield (Y, t ha^{-1})	Unit price (P, \$ t^{-1})	Gross revenue (\$ ha^{-1})	Herbicide cost (H, \$ ha^{-1})	Application cost (A, \$ ha^{-1})	Economic return (ER, \$ ha^{-1})
Untreated control	0.30	650	195.0	0	0	195.0
S-metolachlor (PRE)	0.45	650	292.5	45.3	5.9	241.3
Acetochlor (PRE)	0.94	650	611.0	25.7	5.9	579.4
Bentazon+acifluorfen (POST) at 30 DAS	1.26	650	819.0	33.4	5.9	779.7
Bentazon+acifluorfen (POST) at 60 DAS	0.61	650	396.5	33.4	5.9	357.2
Tepraloxydim (POST) at 30 DAS	0.43	650	279.5	28.0	5.9	245.6
Tepraloxydim (POST) at 60 DAS	0.55	650	357.5	28.0	5.9	323.6
Imazamox (POST) at 30 DAS	1.19	650	773.5	37.0	5.9	730.6
Imazamox (POST) at 60 DAS	0.59	650	383.5	37.0	5.9	340.6
S-metolachlor fb. bentazon+acifluorfen+tepraloxydim (POST) at 30 DAS	1.47	650	955.5	106.7	11.8	837.0
S-metolachlor fb. bentazon+acifluorfen+tepraloxydim (POST) at 60 DAS	0.98	650	637	106.7	11.8	518.5
S-metolachlor fb. bentazon+imazamox (POST) at 30 DAS	1.22	650	793.0	87.2	11.8	694.0
S-metolachlor fb. bentazon+imazamox (POST) at 60 DAS	1.00	650	650.0	87.2	11.8	551.0
Acetochlor (PRE) fb. bentazon+acifluorfen+tepraloxydim (POST) at 30 DAS	1.25	650	812.5	87.1	11.8	713.6
Acetochlor (PRE) fb. bentazon+acifluorfen+tepraloxydim (POST) at 60 DAS	1.53	650	994.5	87.1	11.8	895.6
Acetochlor (PRE) fb. bentazon+imazamox (POST) at 30 DAS	1.44	650	936.0	67.6	11.8	856.6
Acetochlor (PRE) fb. bentazon+imazamox (POST) at 60 DAS	1.90	650	1235.0	67.6	11.8	1155.6

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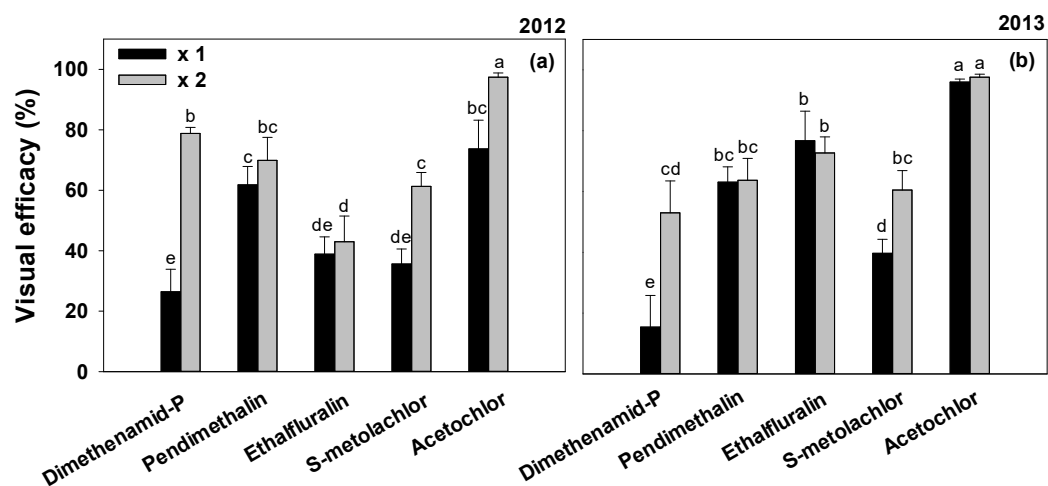
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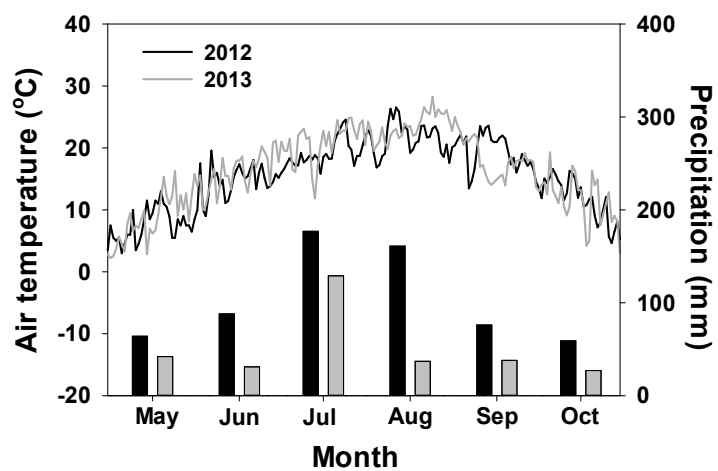
Figure S1. The monthly average air temperature (line) and precipitation (bar) in Bogatyrka, Primorsky krai, in 2012 and 2013.
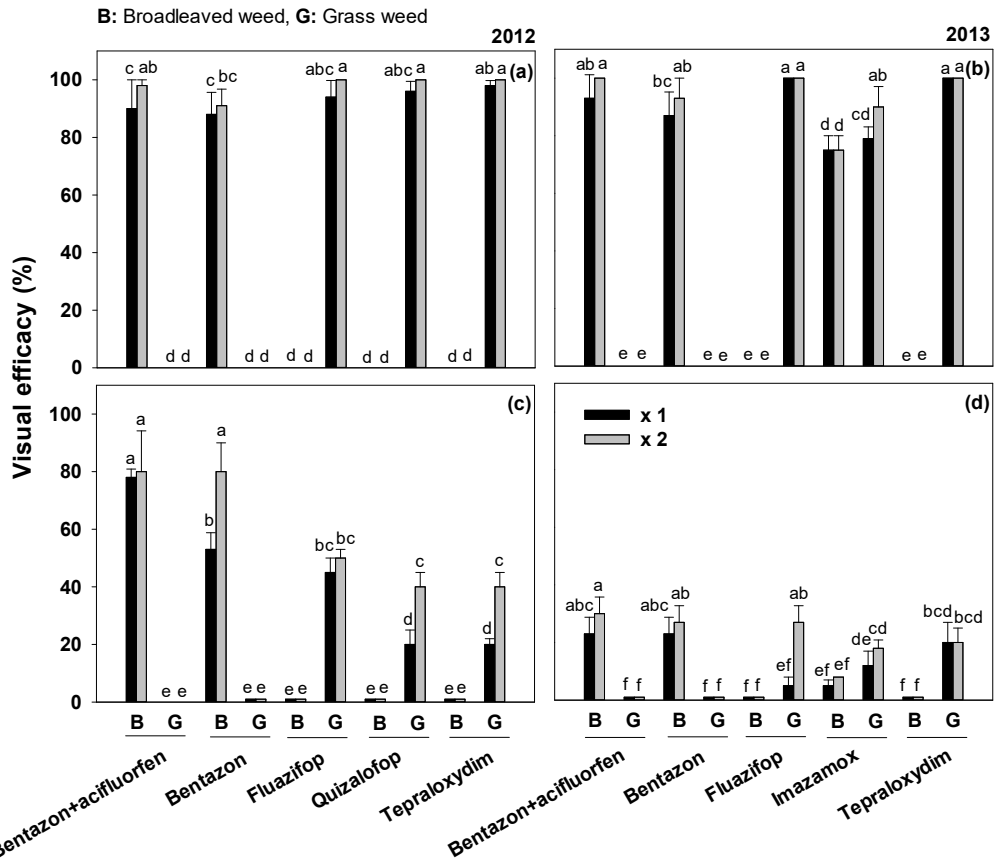
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14 **Figure S2.** The visual efficacy of the PRE herbicides at 30 days after the application of PRE herbicides
15 which were administered immediately after sowing soybean in 2012 (a) and 2013 (b). The vertical bars
16 represent the SE of the mean of three replicates. Means with the same letter are not significantly
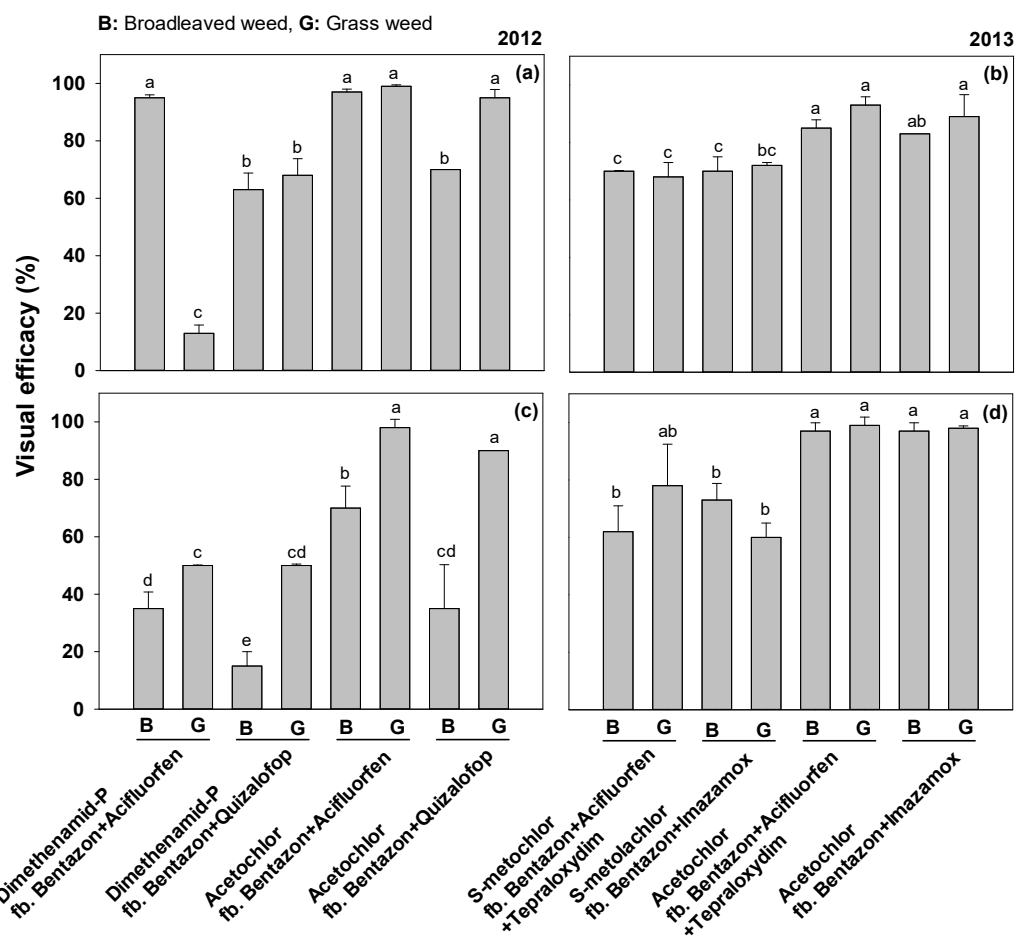17 different by Duncan's multiple range test (DMRT) at $P < 0.05$.

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Figure S3. The visual efficacy of POST herbicides at 30 days after the application of POST herbicides which were administered at either 30 DAS (a, b) or 60 DAS (c, d) in 2012 (a, c) and 2013 (b, d). The vertical bars represent SE of the mean of three replicates. Means with the same letter are not significantly different by Duncan's multiple range test (DMRT) at *P* < 0.05.

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Figure S4. The visual efficacy of sequential application of PRE and POST herbicides at 30 days after the application of POST herbicides which were administered at either 30 DAS (a, b) or 60 DAS (c, d) after sowing soybean in 2012 (a, c) and 2013 (b, d). The vertical bars represent SE of the mean of three replicates. Means with the same letter are not significantly different by Duncan's multiple range test (DMRT) at $P < 0.05$.

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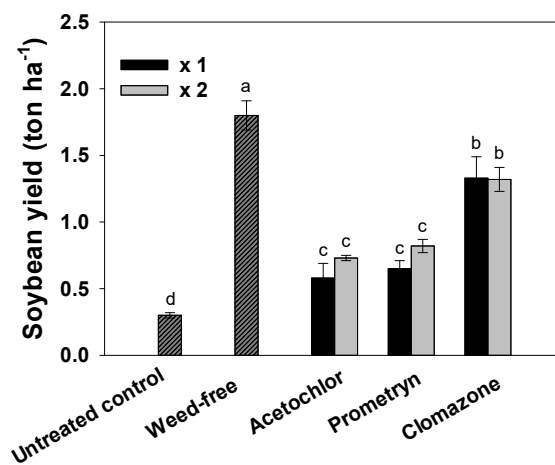
Figure S5. The seed yields (t ha^{-1}) of soybean with a single application of PRE herbicides in comparison with acetochlor in 2014. For an alternative of acetochlor (PRE), clomazone and prometryn were tested at their standard (×1) and double (×2) recommended doses in comparison with acetochlor in the same soybean field as in 2012 and 2013. All of the other procedures were the same as for the performance test for the sole application of PRE herbicides. The vertical bars represent SE of the mean of three replicates. Means with the same letter are not significantly different by Duncan's multiple range test (DMRT) at *P* < 0.05.

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