

Appendix A. Calculated mean aphid quantity ratio (AQR) model for each cultivar based on the ratio of mean aphid numbers found on each cultivar/ mean number of aphids found on 28 cultivars for each sampling data and across 2014.

Cultivar	Pre-period			Mid-period			Late-period			
	16 th May	7 th Jun	14 th Jun	7 th Jul	14 th Jul	21 th Jul	8 th Aug	15 th Aug	22 th Aug	30 th Aug
FD4	0.7303	1.8562	1.2094	1.1961	0.4890	0.9407	1.3176	0.7183	1.0909	1.2505
SARDI 10	0.7348	0.7333	1.0752	0.8510	0.7803	0.3231	0.3837	0.4151	0.3908	1.9169
SARDI 7	0.4345	1.2924	0.9883	0.2576	0.1805	0.5487	0.2693	0.2675	0.2152	0.7500
53HR	1.1627	0.4797	1.3600	0.4812	0.4467	0.4317	0.8434	0.6628	0.9880	0.8935
Zhongmu 1	0.7346	0.3380	0.5706	0.4203	0.5301	0.3565	0.8023	0.7618	0.9970	1.4852
Alfaking	1.8065	1.2402	0.8483	1.8224	3.3745	1.5562	2.6302	2.3581	2.1879	0.7746
Farmers Treasure	1.2554	1.0018	0.9803	1.9149	1.8753	1.5565	1.2618	1.3713	1.4367	0.3340
WL319HQ	0.6919	0.9551	1.0870	1.0036	0.8907	3.1788	0.3504	0.3780	0.2446	0.5718
Algonquin	1.3854	1.3622	0.9982	1.7529	1.3739	2.0210	1.3979	1.5698	0.8921	0.7788
Sanditi	0.5278	0.9008	0.9086	0.3781	0.2597	0.1342	0.4497	0.3994	0.2711	1.2362
Zhongmu 3	1.0736	0.9409	0.8826	0.3193	0.9788	0.7847	0.5914	0.6614	1.2081	0.6702
WL354HQ	0.9309	0.3248	0.9649	1.2885	0.9826	0.1984	1.4309	1.2769	0.7600	0.6228
WL343HQ	0.8386	1.0420	0.9499	0.4068	0.3912	0.2884	0.5525	0.5494	0.5549	0.6923
KRIMA	1.4856	1.0323	1.3495	1.7946	2.3679	0.7320	2.7497	1.8011	1.1065	0.5348
Gongnong 1	1.0234	1.1017	1.0946	1.6094	1.3226	1.6138	1.4860	0.9301	1.3796	0.4294
WL363HQ	1.0449	0.5109	1.4841	1.1403	0.8471	3.2515	0.2940	0.2799	0.4270	2.2932
WL440HQ	0.7104	1.0020	0.7701	2.3218	0.5259	0.7619	0.5602	0.5620	1.2706	1.4729
Sitel	0.9890	0.9908	0.8394	0.7114	0.7528	1.2219	0.8510	1.2422	1.5422	0.8398
WL168HQ	1.3560	0.8952	1.0947	0.6299	0.5191	0.4378	1.2545	1.5984	1.0688	0.4747
Zhongmu 2	0.7985	2.0080	0.8751	0.3462	0.7063	0.6457	1.0878	1.1081	0.9099	0.9743
Derby	0.9220	0.8958	1.6046	0.2562	1.0661	0.6468	0.6729	1.3754	0.9242	0.7793
Cangzhou	1.5308	0.9113	0.2902	2.6683	3.7214	2.3253	1.2192	1.9356	1.8417	1.2392
WL323	0.7581	1.8550	0.6273	0.5917	0.2767	0.3274	0.6497	0.3807	0.5720	1.4846
Apex	0.8682	0.6910	1.3118	0.9978	0.2016	1.1084	0.6378	0.6439	0.7153	0.6603
Queen	1.0568	0.8888	0.8118	0.5288	0.6074	0.4395	1.3309	1.0138	0.5128	0.6069
SARDI 5	0.6980	1.0498	0.8434	0.7723	0.4411	0.3791	0.7437	0.7287	0.6183	1.4683
Gongnong 2	1.1118	0.7029	0.6311	0.8883	0.8745	1.0621	1.0781	0.8713	1.5537	1.1695
SOCA	1.3395	0.9969	1.5491	0.6506	1.2161	0.7282	1.1033	2.1389	2.3200	1.5961

Appendix B. Calculated mean improved aphid quantity ratio (α .AQR) model for each cultivar based on the ratio of mean aphid numbers found on each cultivar/ mean number of aphids found on 28 cultivars for each sampling data and across 2014.

Cultivar	Pre-period			Mid-period			Late-period			
	16 th May	7 th Jun	14 th Jun	7 th Jul	14 th Jul	21 th Jul	8 th Aug	15 th Aug	22 th Aug	30 th Aug
FD4	0.5595	1.9871	1.5807	0.7426	0.8146	0.0000	1.0130	0.5195	1.0114	1.2069
SARDI 10	0.6393	0.8141	1.4470	0.8786	0.9585	0.3967	0.2450	0.2487	0.3513	2.8883
SARDI 7	0.3893	1.7677	1.1308	0.0987	0.2285	0.0000	0.2632	0.1920	0.1343	0.5319
53HR	1.0039	0.3662	1.5443	0.4994	0.0000	2.4651	0.7578	0.5840	0.9601	1.0592
Zhongmu 1	0.4697	0.4597	0.5226	0.1924	0.1737	0.0000	0.8738	0.5344	0.9771	1.0470
Alfaking	2.9146	1.1175	0.8465	2.7129	2.2315	0.9805	2.8616	5.1681	3.3396	0.4405
Farmers Treasure	1.4809	0.9955	1.0904	1.0979	4.4825	5.3010	1.1726	1.1953	2.1376	0.4324
WL319HQ	0.6132	0.9160	1.2232	0.7084	2.2658	5.4346	0.3906	0.3180	0.1595	0.2536
Algonquin	2.0752	1.2101	0.4287	2.1590	6.1181	0.4372	1.0539	3.8600	1.0084	0.8057
Sanditi	0.3686	0.7712	1.6213	0.3173	0.2353	0.1982	0.2860	0.2299	0.3055	1.1605
Zhongmu 3	0.7445	0.8474	0.6735	0.1729	0.7086	0.0000	0.6617	0.7855	1.1038	0.7434
WL354HQ	0.8540	0.3004	0.9534	1.7078	0.6059	0.1223	1.3727	0.7883	0.5362	0.4960
WL343HQ	0.9005	0.7997	0.7908	0.5364	0.5557	1.0811	0.7054	0.3357	0.4107	0.3937
KRIMA	1.6863	0.9842	1.3092	2.1529	0.0000	1.4749	4.9009	1.9110	1.8005	0.7220
Gongnong 1	0.9171	0.8160	0.7330	2.0523	0.9560	0.0000	2.4645	1.2028	1.8189	0.5611
WL363HQ	1.3598	0.5740	1.3850	0.6106	1.2932	3.7674	0.1407	0.1724	0.3071	2.0717
WL440HQ	0.7774	0.8117	0.9107	4.0701	0.0000	2.5406	0.5481	0.6404	1.2931	1.2806
Sitel	1.2628	1.2181	0.8055	0.8196	0.0000	0.0000	1.0190	1.6597	1.9912	0.9461
WL168HQ	1.7342	0.8282	1.2106	1.0174	0.4209	0.9917	1.5995	1.3943	1.0686	0.5913
Zhongmu 2	0.6688	1.9357	1.0769	0.3394	0.8212	0.2440	0.5175	1.2584	0.8085	1.3477
Derby	0.7680	0.8620	2.6174	0.1641	0.2764	0.2016	0.5700	1.5734	0.8507	0.7113
Cangzhou	1.8147	0.7577	0.1763	3.6905	1.9190	0.0000	0.9771	2.1365	1.6222	1.5641
WL323	0.5632	3.0153	0.6428	0.5641	0.2670	1.3640	1.0069	0.4243	0.3757	0.9860
Apex	0.7088	0.7082	1.3987	0.8538	0.0941	2.4157	0.5773	0.6101	0.9432	0.7446
Queen	0.8529	0.7267	0.9926	0.5738	0.0000	0.0000	1.5051	0.9645	0.4840	0.8420
SARDI 5	0.3744	1.0466	1.1029	0.7729	0.6081	0.8520	0.7812	0.4723	0.6187	0.9848
Gongnong 2	1.2522	0.6673	0.4052	0.9036	0.0000	1.3068	1.0829	0.7042	2.1015	0.9234
SOCA	2.0309	1.3649	1.8439	0.8271	0.0000	0.0000	1.4251	3.6774	1.8398	2.1985

Appendix C. Contributions of three natural enemy guilds and *Orius minutus* to assessing alfalfa cultivar resistance to aphids.

Cultivar	α				AQR-AQR* α
	α Spiders	α Coccinellidae	Chrysopidae	α <i>Orius minutus</i>	
FD4	0.958	0.663	0.770	1.224	-0.111
SARDI 10	0.982	0.643	0.347	1.390	-0.119
SARDI 7	1.415	0.660	1.617	1.027	-0.191
53HR	1.348	0.667	2.238	0.871	0.030
Zhongmu 1	1.038	0.938	1.263	1.023	0.064
Alfaking	1.148	1.473	1.921	0.872	-0.328
Farmers Treasure	1.015	1.368	0.574	1.013	-0.110
WL319HQ	1.176	0.828	0.758	1.164	-0.006
Algonquin	0.468	1.647	1.656	0.983	0.011
Sanditi	1.056	0.758	0.347	1.244	-0.141
Zhongmu 3	0.672	0.795	0.499	0.825	0.211
WL354HQ	1.167	0.748	0.217	0.794	0.037
WL343HQ	1.145	0.650	0.651	0.899	0.113
KRIMA	1.103	0.972	2.119	0.734	-0.038
Gongnong 1	0.968	0.685	0.359	0.635	0.251
WL363HQ	1.055	1.092	1.117	1.099	-0.093
WL440HQ	0.885	0.971	0.778	1.135	-0.005
Sitel	0.854	1.159	0.972	1.430	-0.155
WL168HQ	1.039	1.150	0.854	1.009	-0.143
Zhongmu 2	0.704	1.740	0.923	0.996	0.000
Derby	1.069	1.275	1.199	0.974	-0.275
Cangzhou	0.825	0.801	1.288	0.620	-0.005
WL323	1.116	1.077	0.563	0.970	-0.327
Apex	0.875	0.869	0.518	1.138	0.018
Queen	0.813	1.068	0.493	0.866	0.062
SARDI 5	1.062	0.685	0.742	1.068	0.023
Gongnong 2	0.971	1.218	0.828	0.877	0.040
SOCA	1.072	1.402	2.390	1.120	-0.452

Appendix D. Mean Aphid Quantity Ratio (AQR), natural enemy ratio (α) and the improved model of α AQR values of 28 alfalfa cultivars

Cultivars	AQR	α	α AQR
FD4	1.265	1.059	1.339
SARDI 10	0.848	1.100	0.933
SARDI 7	0.905	1.098	0.994
53HR	1.001	0.961	0.962
Zhongmu 1	0.548	0.951	0.521
Alfaking	1.298	1.107	1.437
Farmers Treasure	1.079	1.077	1.162
WL319HQ	0.911	1.100	1.002
Algonquin	1.249	0.972	1.214
Sanditi	0.779	1.063	0.828
Zhongmu 3	0.966	0.726	0.701
WL354HQ	0.740	0.931	0.689
WL343HQ	0.943	0.912	0.860
KRIMA	1.289	1.030	1.327
Gongnong 1	1.073	0.745	0.822
WL363HQ	1.013	1.118	1.133
WL440HQ	0.828	0.978	0.810
Sitel	0.940	1.117	1.050
WL168HQ	1.115	1.015	1.132
Zhongmu 2	1.227	0.937	1.150
Derby	1.141	1.053	1.201
Cangzhou	0.911	0.801	0.730
WL323	1.080	1.046	1.130

Apex	0.957	0.979	0.937
Queen	0.919	0.898	0.825
SARDI 5	0.864	0.961	0.830
Gongnong 2	0.815	0.932	0.760
SOCA	1.295	1.330	1.722

Note: The 17 cultivar in grey indicates their grade division changes from AQR to α AQR.