Section IV: Cereal Crop Pests

Economic Injury Level for Russian Wheat Aphid (Homoptera: Aphididae) on Spring Barley in northern Idaho

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Economic injury levels (EILs) for Russian Wheat Aphid on spring barley have been developed through artificial field infestation in Moscow, Idaho. Damage functions and EILs for RWA on spring barley in 1992 were reported (Lee and Bechinski 1993) and here we update the EILs with 1993's data. The methods were same as that in 1992 (Lee and Bechinski 1993)[1].

Results

Damage function We found no relationship between RWA-days and yield at the flowering stage. This indicated that RWA infesting at flowering stage has no effect on spring barley yield. Therefore, it is not beneficial to spray any chemicals for RWA after flowering stage. On the other hand, we found significant correlation between barley yield and RWA-days at two leaf stage and flag leaf stage. Regression models for the relationship are listed in Table 1 and illustrated in Fig.1. There seems no significant difference in the number of kernels per plant at both two leaf stage and flag leaf stage between 1992 and 1993. However, we noticed the significant difference in the dry weight of kernels per plant at flag leaf stage between two years. We believe that this may be due to mainly weather, especially temperature and precipitation, difference between two years.

Table 1. Damage functions for spring barley yield expressed with RWA-days at two different infestation stage of spring barley in 1992 and 1993.

Dependent variable	1992	1993
	Two leaf stage (Z=12)*	Two leaf stage (Z=12)
No. kernels/plant,	$y=144.5905 - 0.7976x + 0.0014x^2$ $p<0.0008$, $r^2=0.8681$, n=10	$y=139.0805-0.7183x+0.0017x^2$ $p<0.0003$ $r^2=0.9050$, n=10
Dry weight of kernels/plant	$y=4.8599 - 0.0268x + 0.00005x^2$ $p<0.001$, $r^2=0.8621$, n=10	$y=4.2319-0.0259x+0.00006x^2$ $p<0.0009$ $r^2=0.8631$, n=10
	Flag leaf stage (Z=24,31)	Flag leaf stage (Z=24,31)
No. kernels/plant	$y=162.424 - 0.3037x + 0.0003x^2$ $p<0.0008$, $r^2=0.8708$, n=10	$y=164.0559-0.3335x+0.0003x^2$ $p<0.002$ $r^2=0.8303$, n=10
Dry weight of kernels/plant	$y=7.1893 - 0.0113x + 0.00001x^2$ $p<0.0001$, $r^2=0.9195$, n=10	$y=5.6269-0.013x+0.00001x^2$ $p<0.0007$ $r^2=0.8738$, n=10

* Z numbers are Zadoc's scale for cereal plant growth stage.

Economic injury levels are listed in Table 2. Computation of EILs were explained in Lee and Bechinski[1](1993). Given yield potential of 56.2 bu/acre, control cost of $10/acre (insecticide cost + application cost) and market value of $2.5/bu, then EIL is 13 (1992) and 12 (1993) RWA-days per plant at two leaf stage and 47(1992) and 31(1993) RWA-days at flag leaf stage. These EILs will provide Idaho growers and control practitioners with a better decision rule than that currently being used.

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[1]Lee, G.H. and E.J. Bechinski 1993. Effects of Russian wheat aphid (*Diuraphis noxia*) on spring barley yield at three different stages in northern Idaho. 51st Ann. PNW Insect Management Conference. Abstract
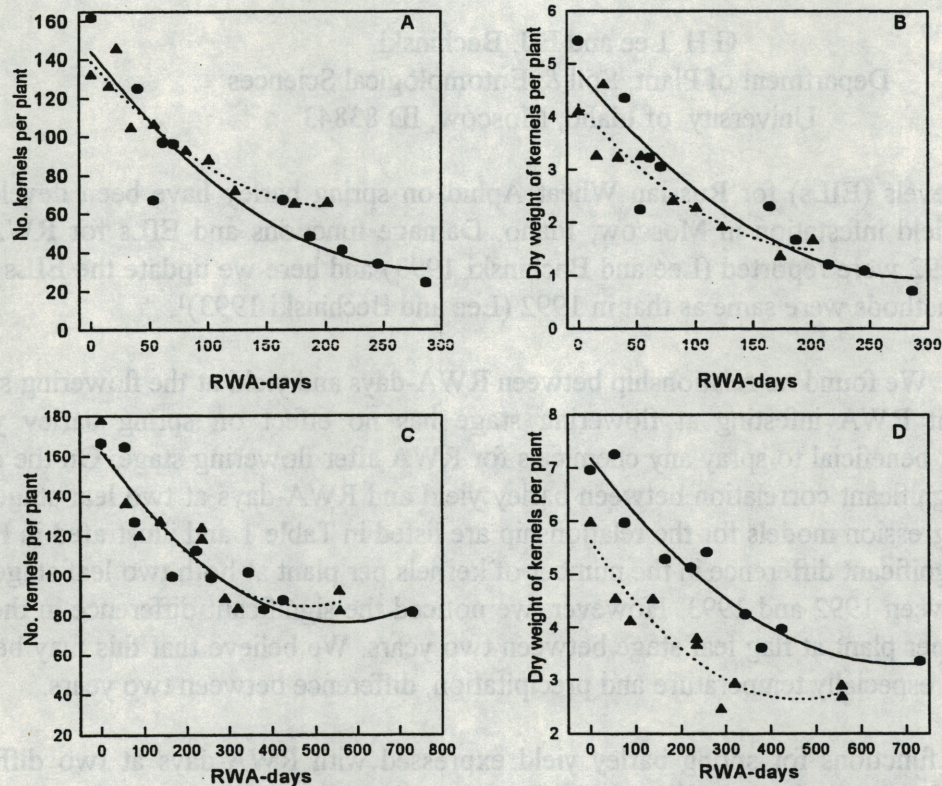
Fig. 1. Relationship between barley yield and cumulative RWA-days (see Table 1 for equation).
A and B: from two leaf stage, C and D: from flag leaf stage. Circle and solid lines are 1992,
and triangle and dotted lines are 1993.

Table 2. Economic injury levels for Russian Wheat Aphid on spring barley expressed as cumulative RWA-days per plant

Control cost ($/acre)	Market value ($/bu)					
	1992			1993		
	2	2.5	3	2	2.5	3
	Two leaf stage (Z=12)					
10	17	13	10	15	12	9
15	25	20	17	23	18	15
20	34	27	22	31	24	20
25	43	34	28	40	31	25
	Flag leaf stage (Z=24, 31)					
10	60	47	39	39	31	26
15	92	73	60	60	47	39
20	128	99	81	82	64	53
25	166	128	104	104	82	67