

Section IV
Biological & Cultural Control

EVOLUTION OF RELEASE AND RECOVERY OF RUSSIAN WHEAT APHID
NATURAL ENEMIES

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Russian wheat aphid biological control began in the late 1980's with the search for predators and parasites in climatically similar parts of the world. After quarantine and mass propagation, general field releases began throughout the western United States. Problems with general field releases included: pesticides, crop maturity and harvest, crop rotation, expansive sites and more recently, a hiatus in widespread Russian wheat aphid populations.

Structured releases were implemented in an effort to eliminate some of these problems. Commercial small fields or portions of fields were contracted to avoid pesticides and provide a green bridge throughout the year. Release cages were used to enhance survivability and recovery opportunities. If necessary, RWA populations could be augmented within the cages. Some problems associated with a commercial environment still lingered including pesticide drift and lack of vegetative diversity. Contracting costs also became a consideration.

More recently, APHIS has shifted to wildlife refuge habitats in an effort to accomplish RWA biological control program objectives. Wheat and barley can be seeded at intervals in the spring and again in the fall to provide a continuous window of activity for RWA and its natural enemies. Plantings are generally small and commingled with a diverse plant community. Irrigation is often available if needed. Pesticides, harvest, drought and low RWA populations are no longer intractable concerns. Utilizing this kind of optimum environment should expedite the search for effective, introduced natural enemies.

The Ridpath Habitat Management Unit along the Snake River in Whitman County, Washington is presently being used by USDA, APHIS for this purpose. Three 1 1/3 acre circles were planted to barley and wheat at two week intervals in the spring. RWA symptoms were noticeable on nearly 80% of the first two spring barley circles. The third circle, planted to spring wheat, completely succumbed to RWA during tillering. The second and third circles were planted to winter wheat in late August and the first circle was left for wildlife. The third circle emerged as a pure stand but the second circle, which had been allowed to mature, sprouted 75% barley. Nearly 100% of the barley showed symptoms of RWA feeding as opposed

to 20% of the winter wheat. Releases began 7/06/95 and ended 10/23/95. One parasite released, *Aphelinus albipodus*, was cultured from a release that had established in Wyoming. Table 1 lists release codes for natural enemies released in Washington in 1995.

Use of emergence canisters has been an important innovation in the recovery of natural enemies. Field surveys for parasitoids and subsequent processing of individual mummies proved to be very time consuming for relatively few parasitoids. Alternatively, simply placing infested plants into the canisters and allowing time for eclosion yielded hundreds of adult parasitoids without the expenditure of much labor or time. Thus far, parasitoid recoveries on RWA at the Ridpath site have consisted of 99% *Diaeretiella rapae* found almost entirely in the spring and summer.

Other parasites found feeding on RWA at Ridpath include: *Aphidius avenaphis*, *Aphidius ervi*, and *Lysiphlebus testaceipes*. Nine aphid species were recorded in association with over forty species of grasses and broadleaves at this site by Dr. Keith Pike and George Graf, I.A.R.E.C. Prosser, WA. *Aphidius* are sent to Dr. Pike for species identification. The land and irrigation are provided by the U.S. Army Corps of Engineers, Walla Walla District, WA.

Table 1. Codes for RWA Natural Enemies Released in 1995 - WA State

Species	Collection Location	Import Identification	Acronym
Coleoptera: Coccinellidae <i>Hippodamia variegata</i> (Goeze) [EPA=INAPBEA]	China: Altai Kazakstan: Alma Alta Syria: Tel Hadya	EPL92-74 EPL91-10 T92012	HvarP1*
<i>Propylea quatuordecimpunctata</i> (L.) [EPA=INABFA]	Greece: Ardasa Spain: Oliana Kazakhstan: Dmitrievka Kirghizia: Chaek	EBCL93-19 EBCL93-21 EPL91-10 EPL91-10	HvarP2* PquaP1*
Diptera: Chamaemyiidae <i>Leucopis ninae</i> Tanásijtshuk [EPA=IOCSADA]	France: Montpellier	EBCL94-21	LninFM91
Diptera: Syrphidae <i>Sphaerophoria scripta</i> (L.) [EPA=IOBJQCA]	France: Montpellier	EPL92-44	SscrFM92
Hymenoptera: Encyrtidae <i>Aphelinus albipodus</i> Hayat & Fatima [EPA=ISBLQIA]	China: Tacheng Wyoming	T92023 NBCL94-1	AalbCT92 AalbWY94
<i>Aphelinus asychis</i> Walker [EPA=ISBLAKA]	Italy: Sicily	EBCL93-14	AasyIS93

* The strains listed have been combined to make one culture.