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NATURAL ENEMIES OF CEREAL APHIDS AND THEIR POTENTIAL IMPACT AGAINST THE RUSSIAN WHEAT APHID (HOMOPTERA: APHIDIDAE) IN ARGENTINA

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Small grain cereals (wheat, barley, oat, rye, and sorghum) play an important role in the economy of Argentina, representing the main exportation products in this country. Argentina is the largest small cereal producer in South America, and is one of the five major countries in the world exporting cereals. Cereal production can be limited by climatic and biotic (pests) factors. Among cereal insect pests, aphids (Homoptera: Aphididae) are the most important; they are responsible for 20-30% yield reduction, attributed to direct demage (feeding) and indirect damage as vectors of virus diseases.

Three aphid species are considered to be economically important in Argentina: The greenbug, *Schizaphis graminum* (Rondani); the rose-grain aphid, *Metopolophium dirhodum* (Walker); and the English grain aphid *Sitobion avenae* (F.). Other aphids causing occasional damage include the cherry oat aphid, *Rhopalosiphum padi* (L.); the corn leaf aphid, *R. maidis* (Fitch); and the cereal root aphid, *R. rufiabdominalis (Sasaki)*.

Control practices for cereal aphids in Argentina have relied mainly on pesticides. In 1979, several biological control studies were initiated by the Instituto Nacional de Tecnología Agropecuaria (National Institute of Agricultural Technology) within an IPM program. The status of cereal aphids as introduced pests justified a classical biological control research project. In addition, the impact of indigenous natural enemies was also evaluated. Efforts were mainly directed against *M. dirhodum, S. avenae,* and *S. graminum.* As a result of this investigations, the following parasitoids and predators have been associated with aphids in Argentina (Botto 1980; Botto & Hernández 1983, 1989; Botto *et al.* 1991; Terán 1989):

APHIDIIDAE
Aphidius colemani (Viereck)
A. ervi Miday *
A. uzbekistanicus Luzhetzki*
A. rhopalosiphi De Stefani *
Diaeretiella rapae (M´Intosh)
Ephedrus plagiator (Ness) *
*Lysiphlebus testaceipes (Cresson)**
Praon volucre (Haliday)
Praon gallicum Stary *
Praon sp.

APHELINIDAE
Aphelinus asychis Walker
A. abdominalis Dalman

COCCINELLIDAE
Adalia bipunctata L.
Coccinella ancoralis
C. septempunctata L. *
Coccinellina limbicolis
Coleomegilla maculata De Geer
C. quadrifasciata

Cycloneda sanguinea (L.)
Eriopis connexa Mulsant
Hippodamia convergens Guerin-Meneville
Olla abdominalis (Say)

SYRPHIDAE
Allograpta exotica (Wiedenann)
Allograpta sp.
*Baccha clavata (*F*.)*

CHRYSOPIDAE
Chrysoperla lanata (Banks)

The parasitoids *A. colemani, D. rapae, Praon sp., P. volucre, A. asychis, and A. abdominalis* are considered to be indigenous. *Aphidius colemani,* originally reported from Argentina in 1913, is the most common and widely distributed parasitoid attacking *S. graminum, R. padi,* and *R. maidis* in this country.

Aphidus ervi was introduced from California, U.S.A, in 1972 against the pea aphid, *Acyrthosiphon pisum* (Harris), and in 1979 against the blue alfalfa aphid, *A. kondoi* Shinji (Teráin 1989). This parasitoid became established and is now widely distributed in Argentina. In 1978, *E. plagiator* was introduced, but it failed to establish. *Aphidius rhopalosiphi, A. uzbekistanicus, P. gallicum, and E. plagiator* were introduced in 1980-1982 from Brazil (EMBRAPA) and France (USDA European Parasite Laboratory) against the aphids *M. dirhodum and S. avenae* (Terán 1989); although the first two parasitoids were not released at all, they naturally moved from Brazil to Argentina, and became established. Despite several attempts to colonize *E. plagiator and P. gallicum,* they never established.

Lisyphlebus testaceipes was introduced from the U.S.A. in 1984 against *S. graminum* in sorghum. The parasitoid became established and is now widely distributed (Botto *et al.* 1991). On the other hand, the ladybeetle *C. septempunctata* was introduced in 1989 from the U.S.A. against *S. graminum* in sorghum, but it did not establish.

Cereal aphids are not considered a current problem in Argentina. During the last decade, aphid populations have not reached the economic injury level in most cases, and no major chemical applications have been required. It is assumed that the indigenous and introduced parasitoids are playing an important role on aphid regulation. This is supported by strong evidence of the natural control of *M. dirhodum and S. avenae* by the parasitoid complex of *A. rhopalosiphi, A. uzbekistanicus, and A. ervi,* (Botto & Hernández 1983; E.N.B, unpublished data).

However, the recent introduction of the Russian aphid*, Diuraphis noxia* (Mordvilko), represents a new threat to cereals in Argentina. Although *D. noxia* was erroneously reported to be present in Argentina in 1979 (Smith & Cermeli 1979), its invasion to this country confirmed in Malargue, province of Mendoza in January of 1991 (Ortego & Delfino 1992). By 1993, this aphid was distributed over several locations of Mendoza. The region where *D. noxia* was first detected is arid, which do not represent the typical cereal production area of Argentina Argentina. Nevertheless, *D. noxia* was detected on wheat in November of 1992 in Algarrobo (Villarino county), southwest Buenos Aires (Dughetti & Larreguy 1993), threatening main cereal region of Argentina. The fast spreading of *D. noxia* in Argentina is similar to that occurring in South Africa, U.S.A., and Chile

Recent evidence showed that *D. noxia* is commonly attacked by the parasitoids *A. colemani and D. rapae,* and several predators, including coccinelids, chrysopids, and syrphids. In addition, the parasitoids *A. asychis and A. abdominalis* might have an important role in the regulation of this new aphid in Argentina (Botto 1980). In Terin, *A. asychis* showed to be very efficient in controlling *D. noxia* (Pike 1992).

The Russian wheat aphid seems to be in its dispersion phase in Argentina, a key time to take appropriate control measures, including classical biological control and conservation of the indigenous natural enemies.

In addition, other IPM strategies such as rational pesticide usage, host plant resistance, and cultural practices should be considered to minimize the impact of *D. noxia in* Argentina.