

Section V
Biological and Cultural Control

THERMAL REQUIREMENTS OF APHIDIUS PICIPES DEVELOPING IN
THE RUSSIAN WHEAT APHID

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Aphidius picipes Nees is an aphidiid wasp of palearctic origin which is currently being released into North America. It and several other parasitoids and predators are being distributed under the auspices of USDA-APHIS in an attempt to regulate population levels of the Russian wheat aphid. The objective of our study was to define the thermal requirements for the development of A. picipes in the Russian wheat aphid.

The A. picipes culture was obtained from the quarantine facility of USDA-APHIS at Mission, TX. The species was obtained from Czechoslovakia. Our culture has been maintained at room temperature using RWA as a host.

The RWA culture was established from individuals collected in Hermiston, OR in the spring of 1990.

Wheat plants (cv Stevens) in the early tillering stage were infested with RWA and were placed in sleeve cages for the aphids to be parasitized. Plants with parasitized aphids were placed into chambers at the following constant temperatures: 10.5 C, 13.5 C, 16.5 C, 19.5 C, 22.5 C, 25.5 C, 28.5 C, and 30.5 C. Photoperiod in all chambers was 16 hrs light:8 hrs dark.

The number of adult parasitoids emerging each day was recorded for each temperature.

The developmental rate from oviposition to adult emergence was plotted against temperature. Points on the linear portion of the curve were regressed so that day-degree requirements and lower developmental threshold could be calculated.

The regression formula from our data in the linear portion of the curve is $y = -0.01998 + 0.003958x$ (r -squared = 0.9996). Thus, it is calculated that A. picipes requires 252.7 day-degrees above a lower developmental threshold of 5.05 C for development from egg to adult.

Michels and Behle (1988) report thermal requirements of the Russian wheat aphid on excised wheat leaves. RWAs, in their study, are calculated to have a lower developmental threshold of 5.28 C and to require 113.64 day degree units above that temperature to reach reproductive maturity.

While the lower developmental threshold for A. picipes and the RWA are essentially equal, heat requirements for the development of the parasitoid are more than double those of its host. Excluding other mitigating factors, such as efficient searching ability, high fecundity, etc., it would seem unlikely that this parasitoid alone will have a major effect on population levels of the RWA.