عنوان پايان نامه	**OVIPOSITION BEHAVIOR OF WHEAT MIDGE *Sitodiplosis mosellana* (Géhin) (Diptera: Cecidomyiidae) AND INHERITANCE OF DETERRENCE RESISTANCE IN SPRING WHEAT**
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چكيده:

Wheat midge, *Sitodiplosis mosellana* (Géhin) (Diptera: Cecidomyiidae), is a key pest of wheat, *Triticum aestivum* L. (Poaceae), in the Canadian Prairies. The larvae destroy wheat kernels, resulting in reduction of quality and quantity of wheat. Deployment of antixenotic wheat lines, which suppress oviposition of wheat midge, can reduce damage in wheat fields. The objectives of this thesis were to explore the interactions between wheat midge and spring wheat with emphasis on oviposition behavior and to explore the antixenosis of wheat to oviposition from the point of view of genetics and crop breeding. In this research, a doubled-haploid spring wheat population was studied, which was the progeny of a cross between a susceptible wheat cultivar 'Roblin' and a resistant (antixenotic and antibiotic) wheat line 'Key 10'. Oviposition of wheat midge on wheat spikes in the laboratory was affected by visual and chemical cues. The visual contrast between wheat spikes and the background color in the laboratory was important in modifying oviposition of wheat midge on wheat spikes. Low contrast resulted in low egg density on wheat spikes in the laboratory. The egg density on wheat spikes in the laboratory decreased when the background color of the spikes was red or black; while yellow and blue backgrounds did not decrease egg density on the spikes. The laboratory study provided evidence that wheat midge oviposition was affected by volatiles emitted by wheat spikes. The volatiles of spikes of a post-anthesis susceptible wheat cultivar, 'Roblin', and a pre-anthesis resistant wheat line, 'Key 10', significantly suppressed the oviposition of wheat midge in the laboratory. It is hypothesized that these volatiles might be a factor in antixenosis of wheat against wheat midge in the doubled-haploid population studied. It is suggested that the differences of oviposition behavior in susceptible and antixenotic wheats, which was observed in the laboratory, might be due to volatiles emitted by wheat spikes. However, other factors such as tactile cues might also be involved. The observation of oviposition behavior in the laboratory on the susceptible wheat cultivar 'Roblin' showed that wheat midge started ovipositing sooner, stayed longer, laid more eggs and left the spike sooner after the last oviposition than on the antixenotic line 'Key 10'. However, the time required for laying one egg was similar when wheat midge was on the susceptible or resistant wheat. The observed antennation behavior of wheat midge while probing the wheat spike might indicate that wheat midge probed for chemical cues emitted by the host plant. The observed ovipositor tapping and dragging on the wheat spike surface while probing the spike suggested that there might be receptors at the tip of the ovipositor which receive tactile cues from the plant surface, guiding oviposition. The correlations between morphological traits of bread wheat spikes and antixenosis in the laboratory were not high enough to conclude that those traits were associated with antixenosis. However, more research on fine scale morphological traits of the spike may reveal relationships with antixenosis. Based on data from a laboratory trial and trials in the field over two field seasons, it was concluded that the antixenosis to wheat midge in the doubled-haploid population was probably conferred by two genes with complementary interactions among genes, and a heritability of 67%. In the two field seasons, the least preferred line received 13% and 11% as many eggs as on 'Roblin'; 'Key 10' received 57% and 20% as may eggs as on 'Roblin'. Our study did not provide evidence for linkage between antixenosis genes and the antibiosis gene, *Sm1,* which is associated with death of larvae of wheat midge. The antixenosis of spring wheat against wheat midge can be considered as a promising mechanism for suppressing wheat midge oviposition in the field. More research is required to reveal additional genetic information which would help crop breeders in production of cultivars antixenotic to wheat midge.