Seed treatments with thiamine reduce the performance of generalist and specialist aphids on crop plants

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Abstract:

Thiamine is a vitamin that has been shown to act as a trigger to activate plant defence and reduce pathogen and nematode infection as well as aphid settling and reproduction. We have here investigated whether thiamine treatments of seeds (i.e. seed dressing) would increase plant resistance against aphids and whether this would have different effects on a generalist than on specialist aphids. Seeds of wheat, barley, oat and pea were treated with thiamine alone or in combination with the biocontrol bacteria Pseudomonas chlororaphis MA 342 (MA 342). Plants were grown in climate chambers. The effects of seed treatment on fecundity, host acceptance and life span were studied on specialist aphids bird cherry-oat aphid (Rhopalosiphum padi L.) and pea aphid (Acyrthosiphon pisum Harris) and on the generalist green peach aphid (Myzus persicae, Sulzer). Thiamine seed treatments reduced reproduction and host acceptance of all three aphid species. The number of days to reproduction, the length of the reproductive life, the fecundity and the intrinsic rate of increase were found reduced for bird cherry-oat aphid after thiamine treatment of the cereal seeds. MA 342 did not have any effect in any of the plant-aphid combinations, except a weak decrease of pea aphid reproduction on pea. The results show that there are no differential effects of either thiamine or MA 342 seed treatments on specialist and generalist aphids and suggest that seed treatments with thiamine has a potential in aphid pest management.

Keywords:

Hordeum vulgare; Pisum sativum; Triticum aestivum; Acyrthosiphon pisum; Rhopalosiphum padi; Myzus persicae

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