



Action Thresholds for Desert Produce Crops

John C. Palumbo

In leafy vegetables, insecticides play an essential role in preventing crop losses and satisfying market demands for cosmetically clean and insect free produce. Fortunately, PCAs have access to numerous insecticides that provide reliable control of key insect pests such as Lepidopterous larvae, aphids, thrips, and whiteflies.

However, insecticides should only be applied when necessary. It is essential to first use a combination of all available IPM tools to prevent pests from damaging the crop. When commonly used cultural, physical, and biological control practices fail to adequately protect the crop, an insecticide application is required. Application timing should be based on a locally developed **Action Threshold (AT)**.

The AT is a decision-making tool that triggers a control action (i.e., insecticide application) when the insect density or damage on the crop approaches a level known to reduce yields or quality. Once the AT is reached or exceeded, an insecticide should be applied as soon as possible to prevent economic losses.

In desert produce there are three types of ATs commonly used:

Prevention: This approach recommends a prophylactic application against a pest that is known to immediately infest or damage the crop upon seedling emergence during stand establishment. Experience has shown that preventative insecticide applications against these pests can quickly prevent unnecessary stand or yield losses. Preventative applications often reduce overall foliar insecticide use.

Nominal Action Threshold: The most common thresholds for foliar insecticide use in leafy vegetables are based on expert opinion and the best available evidence on potential for economic harm. These ATs, based on quantitative insect density or damage levels, are developed by experienced Extension entomologists through field research and experience. The ATs in this document were developed and refined over the past 30 years from research conducted at the Yuma Agricultural Center.

Zero-Threshold: When insect contamination at harvest is not tolerated by produce shippers or buyers, a prophylactic

spray just prior to harvest can be applied to eliminate insect contaminants (trash bugs) from infesting the marketable portions of the crop.

Finally, a good scouting program is essential in Leafy Vegetable IPM. Scouting is all about making informed management decisions. Frequently sampling plants in the field allows PCAs to determine the level of insect infestation or plant damage occurring, and if the AT has been reached or exceeded. Sampling also allows PCAs to avoid unnecessary spraying.

Action Thresholds in Leafy Vegetables

Beet armyworm/Cabbage looper/Corn earworm

Prevention

Apply a soil, systemic insecticide at-planting, with transplant tray drench, or drip chemigation

AT: Foliar sprays

Pre-thinning: Treat when 1% of plants are infested with at least 1 larva (1 larva / 100 seedlings)

Thinning to Heading: Treat when 10% of plants are infested with 1 or more larvae (5 larvae / 50 plants)

Heading to Harvest: Treat when 2% of plants are infested with 1 or more larvae (1 larva / 50 heads)

Additional notes

In early fall plantings (September) of head lettuce, a preventative application with a contact insecticide should be applied just before head formation to prevent corn earworms from moving inside developing heads and becoming inaccessible to control measures.

A contact insecticide (i.e., pyrethroid) can be applied with translaminar or ingestion insecticides targeting larvae to suppress adult moth populations when population pressure is high.

Whiteflies

Prevention

Apply a soil, systemic insecticide at-planting, with transplant tray drench, or drip chemigation

AT: Foliar sprays

Treat when the number of WF adults exceeds an average of 5 adults /plant and large instar nymphs are clearly present on older leaves.

Seedling insects (ground beetles, crickets, grasshoppers)

Prevention

Chemigation at the first sign of seedling emergence

AT: Foliar sprays

Treat when >1% of plants have fresh feeding damage on cotyledons or leaves

Flea beetles Stand establishment

Prevention

Chemigation at the first presence of adult beetles or fresh feeding damage on cotyledons and leaves

AT: Foliar sprays

Treat when >5% of plants have fresh feeding damage on cotyledons or leaves

Aphids

Prevention

Apply a soil, systemic insecticide at-planting, with transplant tray drench, or drip chemigation

AT: Foliar sprays

(Green peach aphid, Potato aphid) Treat when > 5% of plants sampled have at least a single aphid colony (4-5 nymphs) present.

AT: Foliar sprays

(Lettuce aphid, Foxglove aphid) Treat when 1% of lettuce plants have 1 or more winged adults or nymphs infesting terminal growth

Thrips

AT: Foliar sprays

Treat when plants have 2 or more larvae per plant, and/or 10 % of plants have fresh feeding scars on leaves.

Insect Contaminants

Zero threshold: Foliar sprays

Treat when insect contaminants are present on marketable portions of plants prior to harvest.

Action Thresholds in Cole Crops

Seedling insects (ground beetles, crickets, grasshoppers)

Prevention

Chemigation at the first sign of seedling emergence

AT: Foliar sprays

Treat when >1% of plants have fresh feeding damage on cotyledons or leaves

Flea beetles Stand establishment

Prevention

Chemigation at the first presence of adult beetles or fresh feeding damage on cotyledon and leaves

AT: Foliar sprays

Treat when >5% of plants have fresh feeding damage on cotyledons or leaves

Bagrada bug

AT: Foliar sprays

Treat when >5% of plants have fresh feeding damage on cotyledons or leaves

Diamondback moth / Beet armyworm / Cabbage looper

Prevention

Apply a soil, systemic insecticide at-planting, with transplant tray drench, or drip chemigation

AT: Foliar sprays

(Seedling to heading) Treat when >20% of plants infested with 1 or more larvae.

AT: Foliar sprays

(Heading to harvest) Treat when >5% of plants infested with 1 or more larvae

Whiteflies

Prevention

Apply a soil, systemic insecticide at-planting, with transplant tray drench, or drip chemigation

AT: Foliar sprays

Treat when the number of WF adults exceeds an average of 3 adults / plant, and large instar nymphs are clearly present on older leaves.

Aphids

Prevention

Apply a soil, systemic insecticide at-planting, with transplant tray drench, or drip chemigation

AT: Foliar sprays

Treat when > 5% of plants sampled have at least a single aphid colony (4-5 nymphs) present on leaves or terminals.

Insect Contaminants

Zero threshold: Foliar sprays

Treat when insect contaminants are present on marketable portions of plant prior to harvest

Acknowledgements

I would like to thank Peter Ellsworth, Lin Evans, Bill Fox, and Jeff Nigh for reviewing an earlier version of this publication. Their comments and insights on the use of

action thresholds and IPM in leafy vegetables are valued and greatly appreciated.

Additional Resources

1. Management of Insect Pests at Stand Establishment on Desert Produce and Melon Crops https://vegetableipmupdates.arizona.edu/sites/default/files/2024-09/Pests-at-stand-establishment_2023.pdf
2. Palestriped Flea Beetles in Leafy Vegetables and Cole Crop https://acis.cals.arizona.edu/docs/default-source/agricultural-ipm-documents/vegetable-ipm-updates/2024/palestriped-flea-beetles-vegipm.pdf?sfvrsn=a8893885_2
3. Bagrada Bug Management Tips – 2024 https://vegetableipmupdates.arizona.edu/sites/default/files/2024-09/Bagrada%20Bug%20Management%20Tips_VegIPMUpdate_Fall%202024.pdf
4. Insect Management on Desert Produce Crops: Lepidopterous Larvae https://vegetableipmupdates.arizona.edu/sites/default/files/2025-01/Insect-Management-on-Desert-Produce_Lep-Larvae-2024.pdf
5. 2024-25 Guidelines for Diamondback Moth Management in Desert Cole Crops <https://vegetableipmupdates.arizona.edu/sites/default/files/2024-09/Diamondback-Moth-Guidelines-2024-25.pdf>
6. Insecticide Resistance Management for Beet Armyworm and Diamondback Moth in Desert Produce Crops https://vegetableipmupdates.arizona.edu/sites/default/files/2024-10/IRM-Recommendations_Lep-Larvae-in-Desert-Produce_2024.pdf
7. Corn Earworm Management on Desert Produce https://acis.cals.arizona.edu/docs/default-source/agricultural-ipm-documents/vegetable-ipm-updates/2024/cew-management-on-desert-produce_2024.pdf?sfvrsn=3a93033c_2
8. Keys to Effective Aphid Management in Leafy Vegetables https://acis.cals.arizona.edu/docs/default-source/agricultural-ipm-documents/vegetable-ipm-updates/2025/keys-to-aphid-management-in-lettuce-2025.pdf?sfvrsn=d698c672_2
9. Lettuce Aphid on Desert Lettuce -2024 https://acis.cals.arizona.edu/docs/default-source/agricultural-ipm-documents/vegetable-ipm-updates/2024/lettuce-aphid-on-desert-produce-2024.pdf?sfvrsn=a2b86823_2
10. Managing Foxglove Aphid on Desert Produce https://acis.cals.arizona.edu/docs/default-source/agricultural-ipm-documents/vegetable-ipm-updates/2021/210224-foxglove-aphid-in-desert-produce_2021.pdf?sfvrsn=38f0193d_2
11. Insect Management on Desert Produce Crops: Western Flower Thrips https://vegetableipmupdates.arizona.edu/sites/default/files/2025-01/Insect-Management-on-Desert-Produce_Thrips_2024.pdf
12. Thrips and INSV Management in Desert Lettuce https://acis.cals.arizona.edu/docs/default-source/agricultural-ipm-documents/vegetable-ipm-updates/2024/thrips-and-insv-management-in-desert-lettuce-2024.pdf?sfvrsn=3dd20583_2
13. Common Insect Contaminants Found in Arizona Lettuce <https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1137.pdf>
14. Insecticide Modes of Action on Desert Produce Crops https://acis.cals.arizona.edu/docs/default-source/agricultural-ipm-documents/vegetable-ipm-updates/2024/ua-insecticide-moa-groups-vegetables_2024.pdf?sfvrsn=931ac84d_0
15. Using Admire on Desert Vegetable Crops <https://repository.arizona.edu/bitstream/handle/10150/146757/az9517-1995.pdf?sequence=1&isAllowed=y>
16. Cross-commodity Guidelines for Neonicotinoid Insecticides in Arizona <https://repository.arizona.edu/handle/10150/146722>



THE UNIVERSITY OF ARIZONA

Cooperative Extension

AUTHORS

JOHN C. PALUMBO

Research Specialist, Entomology - Entomology, IPM

CONTACT

JOHN C. PALUMBO

jpalumbo@cals.arizona.edu

This information has been reviewed by University faculty.

extension.arizona.edu/pubs/az2116-2025.pdf

Other titles from Arizona Cooperative Extension can be found at:

extension.arizona.edu/pubs

