

Integrated Pest Management Control Strategies

| Pest | Biological Control | Cultural Control | Physical Control | Chemical Control |
|-------------------------------|---|--|--|---|
| Aphid | Lacewings, lady beetles, predatory stink bugs, syrphid flies | Timely planting and harvest; reduce water stress; traps crops (e.g. sorghum) | Reflective mulches or row covers; water jet to dislodge | Insecticidal soap and oil, neem oil, pyrethrin, <i>Chromobacterium</i> (Grandevo), Azera (insecticidal premix) |
| Beet armyworm | Lacewings, lady beetles, parasitic wasps, soldier bugs | Timely harvest; control weedy hosts; sanitation | Destroy egg masses and caterpillars; insect netting to block moths | <i>Bacillus thuringiensis kurstaki</i> (Xentari, DiPel), spinosad, <i>Chromobacterium</i> (Grandevo) viruses (Spod-X) |
| Cabbage looper | Lacewings, <i>Trichogramma</i> parasitic wasp | Sanitation; removal of weedy hosts (e.g. lambsquarter) | Remove crop debris; remove alternative hosts (e.g. wild mustard, shepherd's purse) | <i>Bacillus thuringiensis kurstaki</i> (Xentari, DiPel), insecticidal soap and oil, neem oil, spinosad, <i>Chromobacterium</i> (Grandevo) |
| Cabbageworm | <i>Trichogramma</i> parasitic wasp, <i>Macrolophus caliginosus</i> (predatory beetle) | Plant tolerant cabbage varieties, pheromone traps to monitor Diamondback moths | Destroy caterpillar clusters on leaves; pheromone mating disruption; insect netting | <i>Bacillus thuringiensis kurstaki</i> (Xentari, DiPel), insecticidal soap, neem oil, pyrethrin, <i>Chromobacterium</i> (Grandevo), Azera (insecticidal premix) |
| Colorado potato beetle | <i>Beauveria bassiana</i> (pathogenic fungus), lady beetles, parasitic wasp on eggs | Crop rotation; plant tolerant varieties | Scouting; hand-picking | Spinosad, neem, pyrethrin (for larval control) |
| Cucumber beetle | <i>Celatoria</i> parasitic wasp | Trap crop of Hubbard squash; plant tolerant squash varieties | Insect netting to block beetles (early season protection) | Pyrethrin, neem oil, parasitic nematodes (weekly soil drench) |
| Cutworm | Ground beetles, lady beetles | Vigorously growing plant varieties; timely planting | Cutworm collars for small plants; floating row covers or insect netting to block moths | <i>Bacillus thuringiensis kurstaki</i> (Xentari, DiPel) directed spray to plant base, spinosad foliar and stem spray |
| Flea beetle | Parasitic nematodes (drench in soil) | Timely planting of crops; trap crops | Use row covers to protect transplants | Insecticidal oil, neem oil, spinosad, Azera (insecticide premix) |
| Grasshopper | Nematode bait (Semaspore) in trap crops | Maintain a grassy patch away from main crop and use insecticidal bait | Hand-picking; sweep netting; insect netting | Pyrethrin (multiple applications), Nolo Bait (<i>Nosema locustae</i>) |
| Hornworm | Lacewings, lady beetles, <i>Trichogramma</i> and <i>Cotesia</i> wasps | Remove crop debris at end of season | Hand-picking; insect netting to block moths from egg laying | <i>Bacillus thuringiensis kurstaki</i> (Xentari, DiPel), spinosad, pyrethrin, neem oil, <i>Chromobacterium</i> (Grandevo) |
| Leaf-footed bug | Spined soldier bug, tachinid fly (<i>Trichopoda sp.</i>) | Timely planting of crops, trap crop of sunflowers and forage sorghum | Hand-pick and destroy adults; can use bug vacuum for nymphs | Pyrethrin and spinosad on nymphs (use in conjunction with trap crops), kaolin clay (repellent) |



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|---------------------------------------|--|--|--|--|
| Mole cricket | <i>Larra bicolor</i> wasps, <i>Steinernema scapterischi</i> nematodes | Plant <i>Spermacoce verticillata</i> and <i>Chamaecrista fasciculata</i> to attract <i>Larra bicolor</i> wasps | Hand-pick early in the morning; use sticky traps | Pyrethrin, <i>Beauveria bassiana</i> fungus |
| Spider mite | Predatory mites | Plant and harvest timely, adequate irrigation, tolerant varieties | Water jet to dislodge; prune infested leaves | Paraffinic oil, neem oil, sulfur dust or spray |
| Squash bug | Ground beetles, damsel bugs, tachinid fly parasitoid (<i>Trichopoda pennipes</i>) | Trap cropping with Hubbard squash, plant tolerant varieties, remove crop debris | Insect netting as a barrier to slow insect infestation early in the season | Pyrethrin weekly spray at low populations or at nymphs |
| Squash vine borer | Parasitic wasps, larval and adult ground beetles | Timely planting, tolerant varieties, trap cropping with Baby Blue Hubbard squash | Practice de-worming the stem; insect netting or nylon fabric at plant base to prevent oviposition | Pyrethrin, spinosad (early season spray after detecting moths or eggs at plant base) |
| Stink bug | Parasitic wasps, predatory stink bugs | Trap crop (e.g. sorghum or okra) | Hand-picking; insect netting; fruit bagging to block pests | Insecticidal oil, pyrethrin, kaolin clay (repellent) |
| Thrips | Flower bugs, lacewings, predatory mites | Trap crops, plant varieties resistant to spotted wilt virus | Insect netting (50 mesh or higher) to block entry | Spinosad is very effective, insecticidal soap, paraffinic oil |
| Tomato fruitworm | Flower bugs, lacewings, lady beetles, parasitic wasps | Removal of weedy hosts, sanitation | Hand-picking; block moths with insect netting | <i>Bacillus thuringiensis kurstaki</i> (Xentari, DiPel), insecticidal soap and oil, spinosad, neem oil, <i>Chromobacterium</i> (Grandevo) |
| Vegetable weevil | Soldier beetles | Crop rotation, sanitation, tillage | Hand-picking; timely harvest; insect netting or floating row cover | Diatomaceous earth (abrasive), pyrethrin, neem oil (adults are difficult to control) |
| Whitefly | Lacewings, <i>Encarsia</i> parasitic wasp, predatory mite (<i>Amblyseius swirskii</i>) | Crop rotation | Insect netting (50 mesh or higher) to block entry | Insecticidal soap, neem oil, <i>Chromobacterium</i> (Grandevo) |
| Yellowmargined leaf beetle | Predatory stink bugs | Perimeter or strip crop of turnips and Napa cabbage | Destroy yellow egg masses; remove larvae | Rotate spinosad (larvae and adults) and pyrethrin (larvae) weekly |

Adapted from "Alternative Vegetable IPM Recommendations" by Alabama Cooperative Extension

