

Table 2. Organic Insect Pest Management Toolbox	
Tool number	Technique/strategy
1	Resistant varieties with acceptable horticultural characteristics. e.g. Nasanovia, an aphid resistant lettuce, and Blue Vantage, a green cabbage that has some resistance to aphids and lepidopteran pests.
2	Crop diversity (to avoid large contiguous acreages of similarly susceptible species and varieties) - PFR grew 58 crops in small acreage patches in 2014 (see photos)
3	<u>Crop Rotation</u>
3a	Temporal crop rotation. Avoiding times when pests may be unmanageable.
3b	Spatial crop rotation. Locating serial plantings upwind (especially for weak flyers such as aphids).
3c	Spatial crop rotation. Isolating serial plantings from each other as much as possible (for strong flyers, such as cucumber beetles).
4	Conservation biological control. Development of habitat supporting insect predators and parasites, birds, bats, soil and foliar microorganisms. Fungal pathogens of aphids are frequently observed in many crops, but most frequently in brassicas where one species, Pandora neoaphidis, regularly and rapidly controls cabbage aphids.
4a	Insectary plants as rows within the crop (normally 1 bed/12 beds of crop), or as individuals (one every 50 sq. ft.): white alyssum, Dhani-ya cilantro (a rapidly flowering coriander grown on-farm and not commercially available), bunching cilantro, and white dill. Insectaries are planted in most large acreage crops except onions, shallots and garlic. Insectary plant species vary with crop and time of year to match insectary flowering with crop life cycle.

4b	Hedgerows: native woody perennial shrubs and small trees planted along roads, pruned as necessary with a tractor-mounted trimmer to discourage vertebrate pests. Hedgerows were installed in the 1990's. Saltbush, a dense and invasive species, became a refuge for undesirable vertebrates and was removed in 2017. See CAFF Hedgerows and Farmscaping for California Agriculture.
4c	Summer and winter cover crops (approximately 30% of cropped acreage)
4d	Reduced tillage, destroying fewer soil-dwelling biological control organisms [link to "reduced tillage" in Soil section])
4e	Organic soil amendments (compost and cover crops) to feed soil organisms including those involved in biological control
5	Nutrient management to reduce crop attractiveness to insect pests (e.g. high plant tissue nitrogen increases attractiveness to aphids)
6	Physical protection
6a	Floating row covers to protect crops from root maggots, flea beetles, bagrada bugs, and cucumber beetles. Incidentally, the covers also protect crops from lepdopteran pests, vegetable weevils, squash bugs, and birds.
6b	High tunnels with sides and ends to exclude pest insects
7	Compost tea applications to suppress cabbage aphids (mechanism unknown). [link to "compost tea" in soil section]
8	Transplants to avoid juvenile plant susceptibility to pests (e.g. flea beetle)

9	Scouting fields regularly and use of farm-developed action thresholds for insecticide applications and/or other control measures. Field scouting occurs 1-3 times per week. Frequency increases with temperature. Experience helps to determine the level of an uncontrolled infestation that leads to crop loss and therefore triggers insecticide application(s).
10	Physical pest removal: Insect vacuums to remove large insects such as cucumber beetles and lygus bugs. Fields are always vacuumed at least twice during each treatment. When possible, vacuums are not used when a crop is young because large-sized natural enemies of pests (such as Syrphid fly adults, ladybug adults, Nabids etc. may also be removed before they can control an infestation. Normally, vacuuming is delayed until a few weeks before harvest when it becomes clear that natural enemies won't provide control and if natural enemies are destroyed by the vacuum, another pest won't have time to increase to damaging levels.
11	Habitat removal: Mowing of field margins to reduce alternate hosts for pest arthropods. Mowing also kills wingless aphids and thrip larvae.
12	Supplemental inputs (pesticides). Applied only when systems and tools fail to manage pests to an economic level. Materials with little to no impact on biological control organisms are applied when possible. Registrations and NOP compliance are checked annually.