# CA-CRaFT Program Requirements and Activities

Grower Requirements

1. All commercial California citrus producers are eligible to apply.
2. Application must be received by October 1, 2022, to be considered. Applications should be submitted online through the CRB CA-CRaFT website: www.citrusresearch.org/growers-application
3. Citrus producers are required to maintain and manage the grove throughout the duration of the program.
4. Citrus producers are required to comply with all terms set forth in their contract for the duration of the project as outlined. Failure to comply with these terms will result in disqualification from the program.

Grove Requirements

The program is looking for commercially managed citrus groves in California. While final grove approval will depend on mitigation(s) selected and larger experimental design, grove selection for the program will be considered based on the following factors:

1. Current management practices – priority will be given to those groves actively managing Asian citrus psyllid (ACP) following UC IPM guidelines as part of recommended regional treatments/sprays including areawide mandatory treatments. Both organic and conventional growers are encouraged to apply.
2. Current psyllid pressures – priority will be given to those groves with ongoing ACP pressures and/or in proximity to known ACP risk factors (i.e., transportation corridors, residential areas, packing houses, etc.)
3. Grove location and citrus type – the program is designed to demonstrate ACP mitigation strategies across a range of environmental and varietal differences.
4. Grove size: groves or blocks between 20 and 160 contiguous acres in size are preferred but other block sizes will be considered. There is no limit to the total number of acres a citrus producer may apply for, and growers may submit applications for more than one block or grove.

Other Requirements

1. Citrus producers must provide CRaFT personnel/affiliates with reasonable access to project locations for the purposes of location review and data collection.
    a. Field technicians will conduct trap, tap and visual psyllid counts at program and control sites for the duration of the program. Counts will be conducted twice-monthly May to December, and monthly January to April.
    b. Citrus producers will be required to provide grove data at program start with annual or quarterly updates during the program. Information collected will include but is not limited to grove conditions (e.g. flush timing, pest pressures), pest and disease management activities (pesticide spray product and application timing information), horticultural practices (hedging, pruning, weed management, cover crops), and irrigation practices.

c. Canine-based ACP detection may be available as an added method for psyllid monitoring in some regions, on a limited basis. Applicants interested in utilizing this additional monitoring tool should note their interest within the application.

2. For standardized grove mapping and imaging, the program plans to use drones or unmanned aerial vehicles (UAVs) within the program. Semi-annual or annual surveys will be conducted with prior notice and all information collected will be shared with the grower. Consent of the use of drones or UAVs, for this purpose will be requested of all program participants. Data collected via aerial imaging will include tree counts, missing trees, tree metrics (height and diameter) and overall grove health.
3. Any data collected (images, measurements, observations, etc.) are owned by the CRaFT program, and will be used to generate reports, analyses, and publications in aggregate.

Compensation

1. Compensation will be fixed based on mitigations adopted, but all producers must agree to site surveys to be eligible.
2. Compensation will be made annually following successful completion of all required contract terms, including site survey.
3. To receive compensation, citrus producers will submit a claim form and any required documentation. Payments will be mailed to the producer listed on the application.

## Program Activities

The CA-CRaFT program is designed to test and identify effective ACP management strategies under commercial California citrus production conditions. The strategies that will be tested under this program are divided into two categories – Preventative and Threshold-based.

Preventative Mitigations

Preventative mitigations will focus on physical barriers to exclude ACP along borders where they may be more likely to enter a commercial grove. These border treatments will be prioritized based on proximity to psyllid risk factors. Factors like grove design, tree height, variety, irrigation (in some cases) and available border space should be taken into consideration when selecting this mitigation. If the proposal is approved, growers will be requested to identify and source fencing, trees and trap crops for review and approval with CRaFT staff prior to project initiation. There are three types of permanent barriers expected to be implemented for this project:

1. **Barrier mesh fencing** – would require mesh fencing be added along grove borders. The mesh should be permeable for airflow but small enough to exclude ACP. Mesh fencing recommendations include:
    a. Fencing should be at least 12 feet high
    b. Consist of anti-insect netting or mesh size between 40-50 mesh screen

2. **Living windbreaks** –are trees or shrubs planted along the border of the grove to provide a physical barrier. This mitigation will include support for new plantings or maintenance costs of current immature or mature windbreaks. Recommendations include:
    a. Fast-growing tree or shrub species appropriate for the growing region
    b. Native preferred when available
    c. Non-reproductive host for invasive shot hole borers
    d. Suggested tree types include:
        - Casuarina
        - Cypress
        - Holly leaf cherry
        - Lombardy poplar
        - Oleander (not recommended near grape)
        - Wax myrtle

3. **Trap Crops –** are defined here as trees or shrubs that can host ACP but have not been shown to host the bacterium responsible for huanglongbing. The trap crop will be treated with an approved systemic psyllid insecticide per UC IPM guidelines for ACP. Recommendations include:
    a. Plantings on either one or two border rows
    b. Approved trap crop is the curry leaf tree - *Murraya koenigii* or *Bergera koenigii*

<u>Threshold-based Mitigations</u>

Threshold based mitigations are treatments that are applied once psyllid counts rise above the UC IPM threshold (2 of 10 flushes infested with any psyllid stage, in generally infested areas).

**Border Treatments** - are encouraged in those areas that experience seasonal increases in psyllid populations rather than year-round pressures.

1. **Repellents –** compounds that may not harm psyllids, but which make the crop unattractive. Visual repellents (which alter the appearance of citrus leaves to ACP) may require multiple applications to protect new flush outgrowths. Some repellents can interfere with biocontrol agents so care should be taken when utilizing both methods of mitigation. Current recommended repellants include kaolin clay and diatomaceous earth.

2. **Pesticides** - Effective synthetic and organic insecticides outlined by the UC IPM Program for ACP control. Border-only treatments can be applied to limit psyllids from moving into the grove or to control infestations along high-risk corridors.

**Whole Grove Treatments** - recommended for those cases where psyllids are found within the grove and/or in young orchards due to the abundance of new growth that is attractive to psyllids.

1. **Ant Control –** project efforts will focus on Argentine ant and gray ant control. Ants feed on the honeydew from the ACP and therefore protect psyllids from predators and parasites. Ant control is critical to allow biological control agents to be effective. The recommended chemical control method is bait insecticides.

2. **Biological Control -** the release of ACP predators into citrus groves to reduce ACP numbers, multiple releases are expected annually. Since biological control alone has not shown to be effective in preventing/reducing psyllid populations in orchards, growers utilizing this approach are expected to coordinate this treatment with other mandatory mitigations, such as area-wide treatments.
    a. Applicants can note habitat (i.e., hedgerows) for beneficials, when present, to increase long term biocontrol agent viability.
    b. At this time, biological control agents expected for the program include generalist predator species:
        - Lacewings (adults and larvae)
        - Predatory mites
        - Predatory beetles – ladybeetles

        Other biocontrol agents such as: Syrphid flies or specific ACP parasitoids (i.e. *Tamarixia radiata, Diaphorencyrtus aligarhensis*) may be included in this or future calls for proposals when commercial sources are identified.