Dealing with the Light Brown Apple Moth in Central Coast Strawberries and Caneberries in 2017

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In early May of this year, there was a good deal of commotion concerning an apparently larger than normal infestation of the light brown apple moth in organic strawberries and caneberries. Regulatory activity ramped up, and an eyebrow raising number of berry fields were shut down because of detection of this pest in fruit intended for shipment out of the quarantine, resulting in not insignificant financial loss to many people.

In the way of review, light brown apple moth *Epiphyas postvittana*, better known by its acronym LBAM, is an invasive pest to this country and as such areas infested with this pest, such as the Bay Area, Central Coast and many points south including San Diego are under quarantine for the product of LBAM host crops, which do include strawberries, raspberries and blackberries. This quarantine has been enforced by the United States Department of Agriculture (USDA) and the California Department of Agriculture (CDFA).

It is important that strawberry and caneberry growers in these areas of LBAM quarantine know how to manage this pest so as to avoid the field closures that are a part of the regulatory path following detection in harvested produce. The following article will concentrate on what growers should be doing as far as scouting and management so as to most effectively avoid costly intervention on the part of the USDA and CDFA LBAM quarantine program.

Light brown apple moth larva. Note the copious webbing in association with this larva.
Photo courtesy Jack Kelly Clark, UC ANR.

Scouting

What to look for: Egg masses of LBAM are nearly impossible to find, and so it is not recommended to spend the time searching for them. Grower field inspections should concentrate on finding the larvae, since these are the stage which most often infest harvestable fruit and subsequently cause trouble. LBAM larvae are green and are between a ½ to ¾ inch long (see picture accompanying this article), sequester themselves in leafrolls with copious webbing and frass. LBAM larvae are indistinguishable from those of other leafroller species found in berries (in fact the USDA CDFA regulatory program must submit suspect larvae to a laboratory for analysis of its DNA to make a positive determination), and subsequently it is a really bad bet to think that a found leafroller larva is anything but LBAM. Growers and PCA's should respond to any leafroller larva detection as a signal to treat for control. The adult moths have the distinctive bell shape of leafroller adults, are light brown in color and ¼ to ½ long and have a variety of patterns on the backs of the wings that could be described as patchy.

Times of LBAM activity: It is generally understood that on the Central Coast LBAM has three main peak times

of activity during the course of the year, also known as flights, which usually have been in March, another in June and then another in September. Concurrent with these flights of elevated LBAM activity, one should expect egg laying and subsequent larval appearance in the weeks thereafter. While it is great to understand that there are three main flights per year of LBAM, it is important to recognize that LBAM adults are always around, albeit in lower numbers, between the three main flights and egg laying and larval appearance continuous at a low level throughout the year.

Scouting for LBAM in the field: The USDA and CDFA inspectors are very good at what they do and it is recommended to follow their lead when it comes to scouting for LBAM. In short, if you want to be a good angler, you need to fish where the fish are, and that's what the inspectors are doing when they open a hunt for LBAM larvae in a field. Inspectors check the edges of the field very closely, especially when next to wooded areas, and when they find one larva, they slow down and look around there very carefully because there are sure to be others. Make sure the people you send out to look for larvae know WHAT they are looking for and HOW to look for them to best utilize their time.

Management

There are three legs to managing LBAM in berry fields on the Central Coast, and to achieve the best control, it is recommended to deploy all three, especially in organic fields where the effectiveness of insecticide sprays is less sure.

Deployment of pheromone based mating disruption: Pheromone based twist ties are the first leg of a sound LBAM control strategy, and are very much recommended for use in organically farmed situations. We all need to understand however that these take time to work, since they are disrupting mating and therefore reducing total volume of eggs laid sometime in the future. No moths, eggs, larvae or pupae are being killed by the use of pheromones, and it's just that the numbers of those future generations will be reduced. So those people who did not put twist ties out in March let LBAM adults mate freely and are seeing the consequences currently. It's not too late though, since putting out the twist ties now will serve to disrupt the upcoming moth flight in June and then again in September since they last for about six months. Raise them up a bit on pin flags, lines or sticks over the canopy, and make sure to spread them out EVENLY over the field – no "barriers," big bunches of twist ties in the middle of the field etc. Configurations like every 10-15 feet every third bed should get one to the requisite 300 ties per acre.

Management of LBAM through insecticide sprays, including in organic fields: There are a number of good conventional materials for managing LBAM, including rynaxypyr, methoxyfenozide and spinetoram. Conversely, managing LBAM is a lot more difficult in organic than conventional to be sure. Any formulation of *Bacillus thuringiensis* (Bt) while effective to a degree will generally not give total control in one application, and the material that works well, organically formulated spinosyn, is limited to three applications maximum in strawberries and six in caneberries. In turn one must be a bit more judicious with the applications of this material early in the game because one may need more in a pinch later on, so a strategy of regular Bt sprays to keep down populations is not a bad one. It's understood that Bt, while able to kill smaller larvae outright, tends to just make the bigger larvae sick, they stop feeding for a while, and when they start feeding again the Bt is worn out. Therefore on occasion it might be a good idea to closely space the applications, to have fresh material on the plant for our survivors to feed on. It's worth noting too, that spraying in the evenings is better than in the morning, since UV radiation can break down Bt.

Don't forget about the use surfactants either, they are pretty important when it comes to enhancing the physical and in some cases chemical efficacy of a pesticide.

Always bear in mind to read the label of the pesticide one is using and hew closely to the instructions therein.

Physical Removal of the Leafrolls in the Field: Since detection of a single leafroll in a berry field will lead to closure of that block, if not the whole field it, is imperative that ALL rolls remaining after the above activities be removed. Growers have deployed special crews whose sole objective is finding and destroying and/or removing rolls and they do get good at it and no rolls or larvae remain. Some growers may grumble a bit at the expense of such an activity, but compared to the tremendous loss of money a multiple week regulatory LBAM closure brings about, this expense is perhaps actually not that large as one first may think.

The above has been a review of the management of light brown apple moth (LBAM) in strawberries and caneberries on the Central Coast of California in 2017. For questions on the management of this pest and others, please contact Mark Bolda, UCCE Farm Advisor, *mpbolda@ucanr.edu*

SEE ALSO:

UC IPM's LBAM Web Page:
Light Brown Apple Moth Quarantine, Management, and Potential Impacts

CDFA's LBAM Web Page:
Light Brown Apple Moth (LBAM) Information