CHAPTER 16

Alternatives

This chapter summarizes the analysis of alternatives for LBAM eradication. It presents a series of potential alternatives or "tools" and screening criteria to produce a "toolbox" of options to support the LBAM Eradication Program.

16.1 ALTERNATIVE ANALYSIS AND SCREENING PROCESS

Many processes have been utilized to eradicate insect pests and a screening of those processes was required to concentrate the alternatives to only those that meet the LBAM Program's objective. Therefore, the initial decisive factor, in the alternative evaluation, was to determine if the tool met the Program's primary objective. As discussed in PEIR Chapter 1, the CDFA's objective is to eradicate LBAM from the state of California by 2015. Eradication programs treat the entire pest population with the goal of eliminating it. Eradication would be accomplished using a variety of tools with reliance primarily on biological control methods applied in an effective and environmentally safe manner. The potential list of tools was generated by a step-wise screening process implemented by the CDFA.

Appendix H, Process Used to Select Tools for Use in the LBAM Eradication Program, presents the screening process and a description of analysis of all available tools that could be utilized in the LBAM Program. The criteria used for the initial selection of the available tools include (1) known to be effective against LBAM or related insects, (2) legally available for use in California, and (3) the most environmentally sound tool if several equally effective tools are available. The next level of screening included a more detailed analysis: (1) how the tool is applied, (2) the advantages of the tool, (3) the disadvantages of the tool, (4) a comparison to alternative effective tools, (5) an analysis of the capability and limitation of the tool, and (6) a final decision about whether the tool should be considered for further analysis for the Program. The application of this screening process resulted in a reasonable range of alternatives discussed in PEIR Section 1.3, Alternatives Considered in this Programmatic Environmental Impact Report, as well as the alternatives eliminated from further environmental analysis under CEQA.

16.2 ALTERNATIVES CONSIDERED BUT ELIMINATED FOR CURRENT PROGRAM

Appendix H describes nine tools that were eliminated from further consideration as candidate tools for the LBAM Program. A brief summary of the eliminated tools follows; additional details regarding these tools are provided in Appendix H, Eradication Tool Selection Process.

Integrated Pest Management (IPM) is an approach to controlling pests. IPM evaluates the merits of pest management options and then implements a system of complementary management actions within a defined area. The tools used in an IPM program are similar to those in the LBAM Program; however, the ultimate outcome differs between the two. The primary goal in IPM programs is to use one or more control measures to lower the pest populations within the defined area below economically damaging levels. It is assumed that some damage can be tolerated and that these measures will be needed into the foreseeable future. IPM, as a control strategy, was not evaluated further in the process to determine which tools would be used in the LBAM Program because it does not meet the objective of eradication.

Host removal infield or large-scale requires the elimination of host plants in a selected area. The two strategies for host removal were initially evaluated independently in Appendix H; however, the rationale for

elimination is the same so they are combined in this summary. The removal may deny LBAM a place to build up numbers in a selected area where the host plant is removed. However, the use of host removal for a highly polyphageous pest like LBAM (eats thousands of different plants), especially in an urban environment, is undesirable as it would create an environment devoid of vegetation. This tool would not be environmentally sound and was eliminated from further analysis.

Trap plants can be used to control the damage of polyphageous pests. Trap plants are planted near the plants to be protected. They are more attractive to the pest than the plants to be protected. As the pests concentrate in the trap plants, they can be killed by applying insecticides to just the trap plants. If such plants were identified as being much more attractive to LBAM than others, planting large numbers of them in urban and natural settings and then periodically treating the trap crops with insecticides would encounter obvious logistical problems. Because LBAM is not a very selective insect, it is doubtful this tool would be effective in the LBAM Program; therefore, it was removed from further consideration.

Egg-laying repellents such as kaolin clay can be applied to crops to protect them from egg laying by pest insects (Dufour 2001 as cited in Appendix H). The repellents deter pests rather than killing them. However, for polyphageous pests such as LBAM, females travel to the nearest untreated plants and start laying eggs. The final result is an expansion of the LBAM by dispersal into a larger area seeking plants to utilize for egg laying. The potential alternative of egg-laying repellents does not meet the objective of eradicating LBAM.

Classic biological control makes use of the natural enemies of a pest to control its numbers below economically damaging levels. This approach has had a history of successes in California and when successful classical biological control requires only periodic releases of the natural enemies to achieve permanent controls. However, classical biological controls are not always successful at lowering the numbers of the target pests below an economically damaging level. The CDFA and USDA in collaboration with the University of California are conducting research to identify, acquire, and test the specificity of LBAM natural enemies in Australia. This effort will take several years, if successful. At this time, classical biological controls are not eradicative and would not be a useful tool for further analysis.

Inundative releases of predators not only eliminate LBAM but other prey items as well. Generalist predators will attack a range of other leafroller caterpillars and perhaps other caterpillars of about the same size that occur in their vicinity. As a result of their indiscriminate selection of prey, the inundative release of predators was eliminated due to potential effects to the native ecological community.

Mass trapping of female moths is implemented by the application of dilute port wine to traps (Bioresources 2009 as cited in Appendix H). Data are not available concerning the effectiveness of mass trapping against LBAM. Operational limitations prevent using large number of port-wine-baited traps in an urban setting as well as deploying and retrieving large numbers of traps. At this time mass trapping of females is not eradicative and is not evaluated further for the current LBAM Program.

Quarantines are designed to restrict or eliminate the movement of LBAM within and out of infested areas. By controlling the spread of LBAM, quarantines are useful in LBAM eradication; however, they do not eradicate the pest independently. Quarantines are an interim measure for controlling LBAM while a potential permanent eradication program is being analyzed. Quarantines were not evaluated further because they are unable to permanently eradicate LBAM.

Cultural control-removal of overwintering sites is an integral part of several eradication programs. In these programs, the old crop must be destroyed and the fields plowed by a specific date. Thus, the overwintering sites for the pests are eliminated and their numbers are greatly reduced the following year (Grefenstette et al. 2007 as cited in Appendix H). The removal of old fruit or nuts (mummies) from fruit trees achieves the same population reduction for moth pests whose larvae or pupae overwinter in these sites.

The removal of overwintering sites is most effective against pests that do not breed continuously and that overwinter in a limited variety of sites. However, LBAMs breed continuously throughout the year and their larvae and pupae are found on a wide variety of plants throughout the winter. As with the removal of host plants, the polyphageous nature of LBAM makes the destruction of overwintering sites infeasible. Cultural removal of overwintering sites was not evaluated further due to the inability to eradicate LBAM.

16.3 COMPARISON OF ALTERNATIVES

Table S-1 in the Summary provides a summary of the resource impacts by Program Alternative. Table 16-1 summarizes tools considered for use in the LBAM Program.

Table 16-1 Summary of Characteristics of Tools Considered for Use in the Light Brown Apple Moth Eradication Program

Candidate Tool	Known to be Effective at Lowering LBAM Numbers?	Known to be Effective at Controlling Other Moth Pests?	Used in Eradication Programs Aimed at Other Pests?
Repellents- Feeding	No	Unknown	No
Insecticides	Yes – Rural Industries Research and Development Corporation 2000; Natural Resources and Environment Victoria 2003; Sutton et al. 2003; Baker 2005; Cooperative Research Centre for Viticulture 2006; Mo 2006; Loch 2007	Yes	Yes
Pheromone Mating Disruption	Yes – Code of Environmental Best Practice for Viticulture-Sunraysia Region; Suckling et al. 1994; Rural Industries Research and Development Corporation 2000; Mo 2006; Loch 2007	Yes – Bloem et al. 2005, Femenia-Ferrer et al. 2006, Marti et al. 2006, Stelinski et al. 2006, Welter and Cave 2006	Yes
Classical Biological Control	Yes – Williams 2008; Baker 2005; Mo 2006; Rapley and Sowditch 2006; Loch 2007	Yes	No
Inundative Releases of Parasites	Yes – Code of Environmental Best Practice for Viticulture -Sunraysia Region, Bugs for Bugs a,b accessed online November 5, 2008; Rural Industries Research and Development Corporation 2000; Williams 2008; Oag 2001; Baker 2005; Cooperative Research Centre for Viticulture 2006; Mo 2006; Rapley and Sowditch 2006; Loch 2007; Wine Grapes Marketing Board 2007; Domeney 2008	Yes	No
Sterile Moth Releases	Likely, but no large-scale test has been conducted	Yes – International Atomic Energy Agency 1991; Nguyen and Nguyen 2001; Bloem et al. 2005	Yes
Inherited (F-1) Sterility	No	No	No
Mass Trapping- Male Moths	No	No	No
Male Moth Attractant Treatments	Yes – Brockerhoff and Suckling 1999	Yes – Ioriatti and Angeli 2002	No

Source: Appendix H, Process Used to Select Tools for Use in the Light Brown Apple Moth Eradication Program, Robert V. Dowell, PhD.

The sections below summarize which Proposed Program chemical and nonchemical alternatives have the least risk to human and ecological health or other environmental impact to identify the environmentally superior alternative(s). Several resource sections are not mentioned because they had no impacts or all impacts are the same associated with the Program. The No Program Alternative does not lessen the risk of significant environmental impacts. Rather, it has numerous significant environmental impacts that are largely unavoidable. See Chapter 15, Other Required Disclosures.

16.3.1 Chemical Treatment Alternatives with the Lowest Potential Risks to Human Health from the Use of Pesticides

Alternatives MD-1, MD-2, MD-3, Btk, and S have no human health impacts associated with their implementation. Alternative MMA has potentially significant but mitigable impacts for all evaluation criteria.

16.3.2 Chemical Treatment Alternatives with the Lowest Potential Risks to Ecological Health

Under some applications, using the conservative risk screening risk assessment assumptions, the use of some treatment chemicals exceeded hazard quotients of '1' for some treatment chemicals by some application methods. These exceedances are summarized in Table 12-9 and detailed within Appendix F, Section F5. Based on the analyses conducted in Appendix F, and summarized in Chapter 12, the use of LBAM-specific pheromones under Alternatives MD-1, MD-2, and MD-3 represents the lowest potential risk to ecological health from the use of hazardous materials. Alternative MMA has similar low risk potential, although the incorporation of permethrin into this alternative posed a potentially significant impact to water quality in the absence of mitigation.

16.3.3 Alternatives with the Least Impacts to Noise Levels

Alternatives MD-1 and Bio-P would result in the least impacts to ambient noise levels as both methods would utilize workers on foot to distribute twist ties for MD-1 and index cards for Bio-P. The only increased noise would be from vehicles the workers use to reach the site, and noise levels from those vehicles would not be perceptible above existing noise levels. Alternatives MD-1 and Bio-P would have no impacts on noise. The remaining alternatives would have less-than-significant or potentially significant impacts to noise that are mitigable to less-than-significant levels.

16.3.4 Alternatives with the Least Impact to Air Quality

All Program alternatives have less-than-significant impacts to ambient air quality. Optional mitigation measures are proposed in order to further reduce these impacts. Alternatives Bio-P and SIT have no impacts associated with objectionable odors.

16.3.5 Alternatives with the Least Impacts to Agriculture/Horticulture Resources and Economics

Alternatives MD-1, Bio-P, and SIT would have no impact on agricultural and horticultural resources and economics. Alternatives MD-2, MD-3, Btk, and S would have less-than-significant impacts, while Alternative MMA would have potentially significant adverse impacts that are mitigable to less-than-significant levels.

16.3.6 Alternatives with the Least Impact to Terrestrial Biological Resources

None of the Program alternatives have any impacts to federally protected wetlands or riparian habitat. The impacts associated with chemical exposure of terrestrial invertebrate species are less than significant for all alternatives except the Btk and S Alternatives, which have significant but mitigable impacts. The impacts associated with chemical exposure of terrestrial vertebrate species are no impact or less than significant for all alternatives except MMA Alternative, which has a significant but mitigable impact.

The alternative with the least amount of impacts to terrestrial wildlife would be MD-1 which has three criteria with less than significant impacts and the remainder of the evaluation criteria has no impacts associated with the Program. Alternatives MD-3 and SIT each have one significant but mitigable impact associated with an increase in ambient noise.

16.3.7 Alternatives with the Least Impact to Aquatic Resources

Alternatives MD-3, MMA, Btk, and S have less-than-significant impacts to aquatic resources. Listed aquatic species could have potentially significant but mitigable impacts associated with all alternatives, except the aerial application Alternatives MD-3 and SIT due to the potential for human disturbance to spawning anadromous fish. Alternative SIT has no impacts to aquatic resources including listed species.

16.3.8 Alternatives with the Least Impact to Water Resources

None of the Program alternatives have any impacts to water resources except alternative MMA which has a potentially significant but mitigable impact associated with exceedance of water quality standards when permethrin is used.

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