Expanded efforts needed to limit exotic pests

FRANK G. ZALOM
Director
Statewide Integrated Pest Management Project

JOSEPH G. MORSE
Director
Statewide Center for Exotic Pest Research

California's natural, agricultural and urban environments have been permanently altered by both intentional and unintentional introductions of exotic organisms. Spanish settlers brought exotic crops with them to California, inadvertently introducing complexes of associated pests. Subsequent immigrants and visitors also brought their familiar plants and animals, which harbored exotic pest species.

To combat the introduction of new pests, California developed a comprehensive exotic pest prevention program within the Department of Food and Agriculture (CDFA). However, with increased trade and travel, there has been a dramatic increase in the invasion pathways for new species. CDFA statistics show that a new pest is now introduced into California every 60 days on average. More than 10% of all plant species growing in California are exotic, as are 33% of all freshwater fish species. Exotic pests that have become established are responsible for two-thirds of all crop losses, and it has been estimated that nearly half the organisms listed as endangered or threatened by the federal government are at risk primarily because of competition and predation from introduced plants and animals.

While Mediterranean fruit fly continues to receive considerable attention, both in terms of public investment and press coverage (see p. 28), scores of other pests also pose threats. Examples are the red imported fire ant, the Africanized honey bee (see pp. 4-5) and the Formosan termite. These organisms affect both our urban and rural populations. Exotic fungal diseases such as karnal bunt of wheat and rice blast, and new pests such as the glassy-winged sharpshooter, which transmits the pathogenic bacterium causing Pierce's disease of grapes, almond leaf scorch and oleander leaf scorch, also pose serious economic threats to the state (see pp. 22, 26). Yellow starthistle, just one of many invasive weed species, now infests an estimated 22 million acres of California rangelands, wildlands, parks and roadsides (see p. 7). Like other noxious weeds, it effectively displaces native plant species, and has cost ranchers and state agencies millions of dollars to control.

When new exotic pests present serious economic threats, regulatory officials attempt to eradicate or contain them. The possibility of successful eradication is enhanced by the existing research database, which deals with biology, detection and control. However, once an exotic pest becomes established, strategies for its management must be developed.

Classical biological control is the intentional importation and colonization of natural enemies (predators, parasites and pathogens) that are believed to regulate populations of a pest species in its native territory. This approach represents a very specific tactic for managing, but not eradicating, an exotic pest. Over 400 species of natural enemies have been intentionally introduced into California over the past 100-plus years targeting a number of exotic insects and weeds. Some introductions have proven to be phenomenally successful. One recent example was the successful introduction of a parasite that has reduced ash whitefly populations to acceptable levels throughout California. This issue describes a current attempt at classical biological control of yellow starthistle, and indicates the complexities facing scientists who pursue such studies (p. 8).

Integrated Pest Management (IPM) places the management of pests in a systems framework. It focuses on long-term prevention of pests and their damage through a combination of techniques, including biological control, habitat manipulation, modification of cultural practices and the use of resistant varieties. In an IPM program, pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target pests. Most key pests of California's agriculture and urban areas were once exotic, and the challenge is to provide growers with enough information to effectively manage them within an IPM system.

Exotic pest introductions continually threaten to destabilize established IPM systems. If an exotic pest successfully invades and becomes established, an IPM system will need to be altered to manage the pest with a minimum of economic and environmental disruption. Classical biological control or some combination of IPM tactics may be necessary. UC scientists have been among the leaders in conceptualizing and implementing biological control and IPM, but the scope of exotic pest research now possible pales in comparison to the need. Prevention and control of exotic pests in California would benefit from research on newly introduced exotic species, and the adaptation of research conducted elsewhere. Expanded biological control and IPM research, and increased collaboration with our partners at CDFA, can play an essential role in the management of an exotic pest should it become established.

UC scientists constitute a unique resource of pest management research and outreach expertise. Priorities for research should include investigations of the biology of pests that threaten California, and their mode of entry into the state, as well as development of methods to reduce introductions, eradicate new infestations, or manage species that cannot be eradicated. Such investigations would greatly assist California in meeting the challenges of future exotic pest introductions.