

## **Incorporating Native Vegetation into a Landscape-Scale Integrated Pest Management Program in Ventura County**

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**Impact on California Agriculture:** Conventional agriculture requires the use of pesticides, which average over 5% of growing costs. Pesticides can negatively affect natural biological pest control, thus necessitating further spraying to control secondary pest outbreaks and generating additional costs for growers. Pesticide accumulation outside of agricultural areas can also harm human health and damage ecosystems. Consequently, identifying ways to reduce the use of harmful pesticides is a significant issue in California agriculture.

**Rationale/Introduction:** Integrated Pest Management (IPM) programs seek to use biological control as one way to reduce pesticide use, but still rely disproportionately on chemical control. A promising way to improve biological control available for IPM is by planting natural vegetation on field margins, which can attract beneficial arthropods, birds, and mammals that suppress pest outbreaks. Natural vegetation like hedgerows and flower strips is particularly effective at boosting biological control when these small plantings are relatively close to large natural areas. However, while natural vegetation has been shown to attract beneficial species, its impact on pests is less clear, in part because many studies do not measure pest levels in ways that are economically relevant to growers. This lack of clarity has hampered widespread integration of natural vegetation into IPM programs.

**Experimental Approach:** In this study, we are assessing the potential for natural vegetation to suppress pest outbreaks below economic thresholds in lemon and avocado orchards in the Santa Clara River Valley in Ventura County. We are comparing orchard blocks with and without small natural plantings on their margins. Half of our orchards are adjacent to large patches of natural vegetation, and half are ~1km away. We are comprehensively measuring variation in the potential biological control community, including birds, bats, mesocarnivores and arthropods, and relating this variation to frequency at which arthropod pests exceed economic thresholds.

**Major Conclusion:** Our results thus far show that the abundance and diversity of insectivorous birds is higher in orchards with nearby natural vegetation, as is the abundance and diversity of pollinators and natural arthropod enemies. Some arthropod pests exhibit greater abundance in orchards with vegetated margins, but others decline when the amount of non-crop vegetation near orchards increases. Our study suggests that proximity to patches of natural vegetation may improve biological control in avocado and lemon orchards in Ventura County.

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