

## Introduction

### Background, Purpose, and Use of This Guide

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Production of high-quality hops requires careful attention to numerous arthropod, disease, and weed pests, as well as horticultural practices that may exacerbate or suppress these pests. Multiple plant pathogens and arthropods have been documented as pests of hop, and many plants common to hop-producing regions can become weeds in hop yards in certain circumstances. The damage pests and diseases cause ranges from insignificant to complete economic loss due to direct reduction in yield or diminished cone quality.

The goal of the first edition of *Field Guide for Integrated Pest Management in Hops* in 2009 (as well as the slightly revised second edition in 2010) was to provide growers, consultants, extension personnel, and other pest managers with what was then the most current science-based information on identification and management of arthropod pests, beneficial organisms, diseases, and weeds affecting hop, specifically hop plants grown in the dominant hop-producing states of the Pacific Northwest. In this third edition, we have expanded our scope beyond the Pacific Northwest to encompass several regions where hop production is increasing, making the scope of this book national and attempting to address the needs of both large and small hop producers in established, emerging, and reemerging hop-producing regions. Regional craft brewers are seeking local sources of hops to appeal to their consumers. In expanding the scope of this handbook, we hope to assist new hop growers in their efforts to control pests as they learn to produce hops in the microclimates associated with their geographic locations.

In this third edition, we continue the emphasis set forth in the previous editions in promoting the adoption of integrated pest management (IPM) strategies including whole-farm IPM planning, consideration of pesticide toxicology, and nutrient management (to the extent that it impacts the pest complex and its management). Our aim is to educate and assist the grower and pest manager so they can better utilize the

latest pest management information in the context of an entire farming system. Correct identification of pest problems is the first step in IPM, therefore color images and graphics have been included as diagnostic aids wherever possible. Information is presented on the life cycle and biology of the primary pests of hop to provide key concepts underlying management recommendations.

This book is not intended to prescribe which products to use in specific instances, nor is it intended to replace university-based extension guidelines for pest management in the various states in which hop plants are grown. Products mentioned in this field guide have been registered by the U.S. Environmental Protection Agency, but users should check with their own state or local pesticide regulatory authority to determine whether use is approved in their location. A partial list of resources on current pesticide registrations for hop is provided on Page 101.

In many cases, when a specific pesticide is listed in this field guide, it will be listed as the name of its primary active ingredient (e.g., glyphosate), followed in parentheses by one or more of the most common trade names (e.g., Roundup). Use of a particular trade name in this instance is not intended to exclude other trade names under which the product may be marketed. Trade names are provided as a frame of reference only.

The first edition of the *Field Guide for Integrated Pest Management in Hops* was followed with a pocket-sized English/Spanish companion guide that many found useful. Our intent is to follow suit and produce pocket companions to this comprehensive third edition that will be specific to the various geographic regions in which hops are now being produced.

The editors acknowledge the significant contributions of numerous general and pest-specific references that provided the foundation and scaffolding for this handbook and its previous editions. A few of the general publications used are provided on page 101, Resources.

### At a Glance: Main Sections of This Field Guide



#### Diseases pp. 12-44



#### Insect Pests pp. 47-70



#### "Good Bugs" pp. 71-86



#### Weeds pp. 87-97