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Use and Importance of Ametoctradin in Arizona Agriculture
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Ametoctradin Use in Arizona Agriculture

Ametoctradin is used for the control of downy mildew on lettuces, spinach and other leafy greens, brassicas, onions and garlic, and to control Phytophthora (late blight) on potatoes. Based on information from the Arizona Pesticide Use Database (Fournier et al. 2017), which captures pesticide use records submitted to the state, the most significant uses of ametoctradin are in lettuces (all types), spinach, arugula, kale, and onions. Other crops with a portion of acres treated most years include Swiss chard, mustards, broccoli, cabbage and cauliflower.

Based on recent research trials conducted by Dr. Bindu Poudel-Ward, University of Arizona Extension Plant Pathologist and Plant Disease Diagnostician based in Yuma, Arizona, Zampro (ametoctradin + dimethomorph) was one of the top 3 products out of 18 fungicides and fungicide combinations tested for the control of downy mildew on lettuce. Zampro also scored in the top 3 out of 13 treatments tested on spinach (Poudel-Ward, unpublished data).

According to Dr. Alex Hu, University of Arizona Extension Plant Pathologist based in Tucson, Arizona, ametoctradin is also important for the control of potato blight (Phytophthora). Potatoes are an expanding crop in Arizona, with plantings in the central and southeast regions of the state.

Downy Mildew

Downy mildew is a significant and regular disease of spinach and lettuces in Arizona, and also causes damage across a number of other crops, including onions and brassica crops. The conditions conducive to pathogen development are present every year in Arizona, and active controls and prevention tactics are deployed by growers to control downy mildew. In young seedling lettuce, downy mildew symptoms appear as fluffy white growth on cotyledons and young leaves, resulting in stunting and plant death. On older lettuce plants, symptoms include yellow spots on upper sides of leaves, which later become necrotic brown or tan lesions. Under favorable conditions, fluffy white fungal growth occurs on the undersides of affected leaves. Systemic infections occur infrequently but can cause dark discoloration of stem tissue (Matheron

2015, Koike & Turini 2017). Downy mildew causes significant cosmetic damage, making affected lettuce plants unmarketable.

According to former University of Arizona Extension Plant Pathologist, Dr. Mike Matheron, "Optimal management of downy mildew is achieved by having a fungicide in place before disease symptoms become apparent. Less than optimal control will occur when fungicide applications are not started until downy mildew symptoms are visible on plants." (Matheron 2017a). Control of downy mildew can be difficult, because of the complexity of the pathogens involved. For example, the distinct pathogens which infect lettuce and spinach each consist of multiple races, with new races emerging as the pathogens evolve. For this reason, resistant cultivars are not a stand-alone control tactic. Growers rely on fungicides for control of downy mildew, and resistance management practices are extremely important to decrease selection of fungicide-resistant components within pathogen populations (Matheron 2020).

The Fungicide Resistance Action Committee recommends a number of resistance management strategies, including: rotation of multiple modes of action in the treatment program; limiting the number of applications of any particular mode-of-action each season; applying fungicides at the full recommended rate; targeting fungicide applications for disease prevention, not eradication; integrating fungicide use with other tactics, including biological control, disease-resistant cultivars, crop rotation, and other beneficial cultural practices (Matheron 2014). In Arizona, rotation of different fungicidal modes of action is broadly adopted by growers. We do not yet have reliable downy mildew resistant varieties. Biologically based fungicides which have been tested have not shown sufficient levels of efficacy against downy mildew under field conditions in Arizona (Matheron 2017b), but when combined with chemical fungicides can contribute to effective control programs.

Lettuce and other leafy vegetable crops

Arizona growers are one of the leading producers of fresh-market vegetables in the U.S., producing vegetables and melons at an estimated total economic contribution of over $2.5 billion in 2015 (Kerna et al. 2016). This includes about 90% of all fresh lettuce consumed in the U.S. in the winter (Satran 2015). In 2021, the combined value of production for head lettuce, leaf lettuce and romaine exceeded $651 million, with production on 63,900 acres (USDA-NASS 2021).

According to the Arizona Pest Management Center Pesticide Use Database, an annual average of about 25,000 acres of lettuce (all types) reported ametoctradin sprays between 2016 and 2020. Over the same time period, an average of over 4,200 acres of spinach were treated (Fournier et al. 2017). These are likely conservative estimates of use, because grower-applied sprays typically do not require reporting in Arizona.

One Pest Control Advisor (PCA) familiar with the produce industry says he regularly uses Zampro (ametoctradin + dimethomorph) on several types of lettuce, and less frequently on broccoli and cauliflower. It is a user-friendly and effective fungicide which he describes as "a go-to product" for downy mildew control. One feature that makes it helpful to growers is a pre-harvest interval of zero days on several crops.

Zampro most commonly goes out at the full rate (14 fl oz/A), with a mean rate of 12.28 fl oz/A across all lettuces. Applications may be made by air or ground (Fournier et al. 2017).

Brassica Crops

In 2021, the combined value of production for broccoli, cabbage and cauliflower exceeded $222 million, with production on 21,000 acres (USDA-NASS 2021).

There is far less use of ametoctradin use on brassica crops because downy mildew affects the foliage and not the head, which is harvested. Most of the use is on cabbage and broccoli, with a small percent of acres treated annually.

Onions

Arizona produces dry onions and high-quality onion seed for export. In 2017 Arizona harvested 2,154 acres of onions and 1,312 acres of vegetable seed (onion seed data not broken out). Onion seed grown in Arizona contributed to the $3.8 million in vegetable seed sales in 2017 (USDA-NASS 2019).

Downy mildew has become a major problem in recent years in onions produced for consumption and for seed. Production is impacted every year, with significant yield losses possible. According to a Yuma-area PCA who works with onion growers, the past few years they have seen a significant increase in downy mildew. As in produce, access to multiple active ingredients across modes of action is important to avoid resistance issues.

Zampro is used in production of Arizona onions, including seed onions, for prevention and control of downy mildew. Zampro is typically at the full rate (14 fl oz/A), with a mean rate of 12.86 fl oz/A across all lettuces. Applications may be made by air or ground (Fournier et al. 2017).

Who We Are

The Arizona Pest Management Center is host to the University of Arizona's expert IPM scientists including Ph.D. entomologists, weed scientists and plant pathologists with expertise in the strategic tactical use of pesticides within IPM programs that protect economic, environmental and human health interests of stakeholders and the society at large.

Dr. Al Fournier is Associate Director of the APMC / Associate Specialist in Entomology, holds a Ph.D. in Entomology, and has expertise in evaluating adoption and impact of integrated pest management and associated technologies. He works with the Western IPM Center as IPM Network Coordinator for the Southwest states, representing stakeholder interests in EPA registration reviews. Dr. Bindu Poudel-Ward is a University of Arizona Extension Plant Pathologist and Plant Disease Diagnostician based in Yuma Arizona. She works primarily with the produce industry. Dr. Jiahuai "Alex" Hu is a University of Arizona Associate Professor and Extension Plant Pathology Specialist based in Tucson, Arizona. He works with growers of cotton and other row crops, as well as tree nut producers. Mr. Wayne Dixon holds a B.S. in Computer

Information Systems and develops tools and data used in IPM research, education and evaluation, including management of the APMC Pesticide Use Database.

These comments are the independent assessment of the authors and the Arizona Pest Management Center as part of our role to contribute federal comments on issues of pest management importance and do not imply endorsement by the University of Arizona or USDA of any products, services, or organizations mentioned, shown, or indirectly implied in this document.

Our Data and Expert Information

Through cooperative agreements with Arizona Department of Agriculture, the Arizona Pest Management Center obtains use of, improves upon, and conducts studies with ADA's Form1080 data. Growers, pest control advisors and applicators complete and submit these forms to the state when required by statute as a record of pesticide use. These data contain information on 100% of custom-applied (i.e., for hire) pesticides in the state of Arizona. Grower self-applied pesticide applications may be under-represented in these data. In addition, the Arizona Pest Management Center is host to scientists in the discipline of IPM, including experts in the usage of this and other compounds in our agricultural systems. We actively solicit input from stakeholders in Arizona including those in the regulated user community, particularly to better understand use patterns, use benefits, and availability and efficacy of alternatives. The comments within are based on the extensive data contained in the Arizona Pest Management Center Pesticide Use Database, collected summary input from stakeholders and the expertise of APMC member faculty.

Summary

Ametoctradin is a critical tool for our growers, due to its efficacy and flexibility. It is one of the most important active ingredients we have for control of downy mildew in lettuces, onions and other crops. Because growers require multiple applications of fungicides with different modes of action to control downy mildew in lettuces and other leafy green crops, it is also a valuable rotational tool for resistance management.

Thank you for the opportunity to comment. Please feel free to contact me if I can provide any additional information that would be helpful in support of the registration review process for ametoctradin

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