



**Buprofezin Use In Arizona**  
**Prepared by Peter C. Ellsworth, Al Fournier, Wayne Dixon & John Palumbo**  
**Comments submitted by the Arizona Pest Management Center**  
**University of Arizona**

EPA Docket: EPA-HQ-OPP-2012-0373-0001

***Summary***

*Buprofezin is a key, selective compound with an impeccable history of safe and effective use in Arizona agriculture. It is used on more than 22 different crops primarily for the control of whiteflies and the viruses they vector. The main crops grown in Arizona that depend on buprofezin in one or more product formulations include cotton, melons of all types, lettuces of all types and cole crops. 82% of buprofezin sprayed acreage is cotton, where Courier is an important product that serves a major role in IPM programs designed to conserve natural enemies. Buprofezin along with other selective chemistries has been part of a revolution of practice in cotton IPM, replacing broadly toxic pyrethroids, organophosphates, carbamates and endosulfan. Cotton has seen major reductions in the use of all neurotoxic insecticides (nearly 19 million lbs ai since 1996), spraying insecticides just 1.5 times to control all arthropod pests season-long. Introduced in 1996 under Section 18 Emergency Exemption for cotton, buprofezin along with pyriproxyfen and Bt cotton ushered in a period of sustained and progressive improvements in cotton IPM helping growers realize cumulative gains estimated to be in excess of \$388 million. Buprofezin provides a unique chemistry to a diverse program of whitefly management across multiple crops, where growers have established landmark agreements to share and conserve this and other chemistry to avoid resistance. The current labels for buprofezin are needed and appropriate to the use of these products. Some consideration should be given to the harmonization of cotton and vegetable maximum use rates so as to limit the potential for confusion among growers and practitioners. The Arizona Pest Management Center, host to the University of Arizona's expert IPM scientists and a unique 22 year historical pesticide use database, supports the continued safe and effective use of buprofezin in multiple Arizona crops as part of comprehensive IPM programs designed to protect economic, environmental and human health interests.*

EPA is currently seeking information regarding certain active ingredients including buprofezin. The Arizona Pest Management Center provides the information below in support of this very important and strategic active ingredient.

Through cooperative agreements with Arizona Department of Agriculture, the Arizona Pest Management Center obtains use of, improves upon, and conducts studies with ADA's Form L-1080 database. This database, among other prescriptions, contains data on 100% of custom-applied pesticides in the state of Arizona. In addition, the Arizona Pest Management Center is host to scientists in the discipline of IPM including experts in the usage of this compound in our

agricultural systems. The comments within are based both on the extensive data contained in the Arizona Pest Management Center Pesticide Use Database and the expertise of its member faculty.

Our analyses of EPA's interests during this public comment period include the following issues.

1) The pesticide can perform its intended function without unreasonable adverse effects on human health or the environment.

Buprofezin (trade names, Courier, Applaud & Vetica) has contributed to one of the most successful transformations of an agricultural industry in history. With its initial introduction under Section 18 Exemption in 1996 for the control of Sweetpotato Whitefly in cotton, growers revolutionized their practices and now favor the use of very strategically selective compounds for the control of whiteflies and other pests. Buprofezin was one of the first selective building blocks added to our IPM systems for both cotton and the very productive fresh vegetables industry of Arizona. Because it replaces multiple uses of broadly toxic pyrethroids, organophosphates and the now terminated endosulfan, Arizona's IPM programs are now safer for users and pest managers, as well as for consumers and the local environment. Buprofezin continues to be a key compound used in the control of whiteflies in cotton and produce, as well as in the control of some other insect pests (e.g., scales). There have been no adverse effects on users, the broader consuming public, surrounding environments or non-target organisms including pollinators. Naranjo & Ellsworth (2009a,b) have documented the safety and selectivity of this compound to non-target organisms and the "bioresidual" (Ellsworth & Martinez-Carrillo, 2001) that it enables in the selective management of *Bemisia tabaci* in cotton.

2) Confirmation of the following label information: sites of application; formulations; application methods and equipment; maximum application rates; frequency of application, application intervals, and maximum number of applications per season; geographic limitations on use.

Our analyses of usage in Arizona and the opinion of IPM experts suggest that the current label information is adequate for the effective and safe use of buprofezin in our environment. However, some consideration should be given to increasing (less than 10%) the permissible use rate for cotton to bring it in uniformity with most of the other crops on the Courier 40SC label (see response #4). Supplemental use labeling that permits a PHI up to 1 day in cucurbit vegetables is appropriate and necessary to permit sequential harvesting of these crops.

3) Use distribution (e.g., acreage and geographical distribution of relevant use sites).

Arizona's irrigated agricultural production that depends on buprofezin is largely confined to 6 desert Counties: Pinal, Maricopa, Pima, Mohave, La Paz, and Yuma. In 17 use seasons (1996–2012), buprofezin was used on 22 crops including cole crops, leafy vegetables, vegetable seed crops, citrus, melons and cucurbits, and cotton. Over 395,000 acres were sprayed with buprofezin during this period, 82% of this on cotton. Over 132,400 lbs ai were applied to all crops in Arizona, 1996–2012. Charts depicting historical acreage and lbs ai usage patterns for buprofezin applied to cotton (Fig. 4) and to melons (Fig. 5) appear at the conclusion of this report.

4) Median and 90<sup>th</sup> percentile reported use rates from usage data – national, state, and county.

The rates used in Arizona differ according to crops being sprayed. Citrus uses permit much higher rates than for vegetable or field crops, but only a handful of sprays have been made in citrus for whitefly or scale pests. As already noted, the majority of acreage sprayed with buprofezin is cotton. However, melons and lettuces of all types are also often sprayed with buprofezin. The average rate for all non-cotton, non-citrus uses (N =

2348) is 0.235 well below the label maximum. The median and 90<sup>th</sup> percentile use rates for these crops are 0.236 and 0.368 lbs ai / A, respectively. In these cases, the maximum labeled rate is 13.6 fl. oz. per acre of Courier or 0.38 lbs ai / A, though the label maximum fl. oz. instructions calculates to 0.3825 lbs ai / A. For cotton, the mean and median use rates are 0.338 and 0.348 lbs ai / A, respectively (N = 3463). This is very close to the label maximum of 0.35 lbs ai / A — the label actually permits 12.5 fl. oz. of Courier, which is equivalent to 0.351625 lbs ai / A (over the stated lbs ai / A limit). The 90<sup>th</sup> percentile use rate is 0.354 lbs ai / A, actually over the label maximum for cotton. We believe that this is due in part to the small differences in maximum label rates for vegetables (e.g., melons and lettuce) at 0.36825 lbs ai / A vs. cotton at 0.351625 lbs ai / A and the fact that pest control advisors who scout melons and other vegetables are often also scouting cotton acreage. To eliminate user confusion, there might be some benefits of bringing the labeling into uniformity for these crops; i.e., increasing the label use maximum for cotton to 13.6 fl. oz. of Courier. Head and Stem Brassica Crop Subgroup 5A, Cucurbits Crop Group 9, Fruiting Vegetables Crop Group 8, Leafy Vegetables Crop Group 4, and Snap Beans all have labeled maximum Courier rates of 13.6 fl. oz. / A. Only Cotton (12.5 fl. oz. / A) and Low-Growing Berry Crop Subgroup 13-07G (12.0 fl. oz. / A) have a lower maximum use rate on the Courier label. Arizona usage data is summarized below.

	Cotton	Non-Cotton*
No. of 1080s	3563	2348
Mean Use Rate (lbs ai / A)	0.338	0.235
Median Use Rate	0.348	0.236
90th Percentile Use Rate	0.354	0.368
Maximum (listed) Label Rate	0.35	0.38
Maximum (calculated) Label Rate	0.3516	0.3825

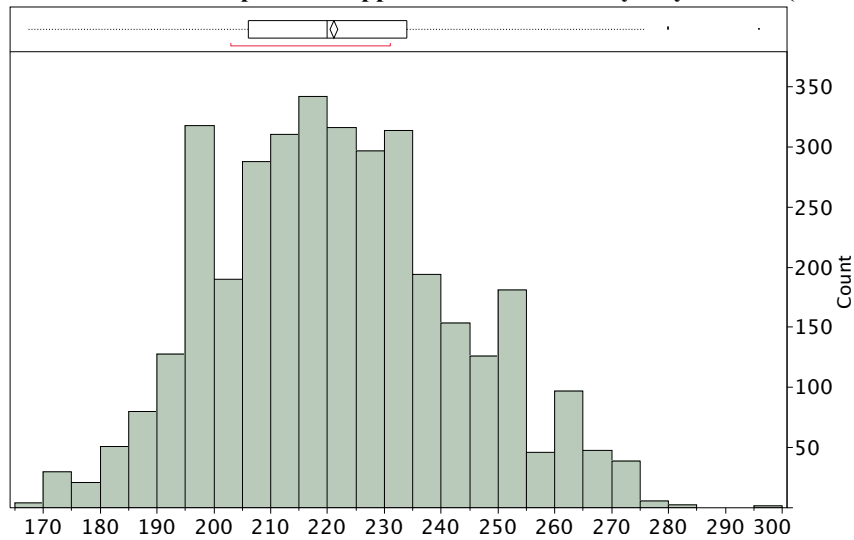
\*Excluding citrus

## 5) Application timing (date of first application and application intervals) – national, state, and county

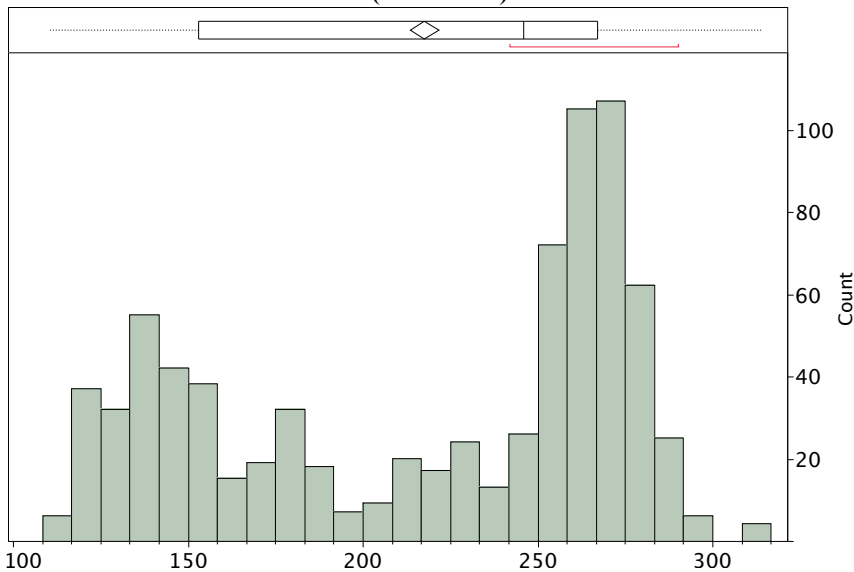
Most buprofezin labels permit up to 2 or 3 sprays; however, multiple applications of buprofezin is an uncommon practice except under unusual pressure or other conditions (e.g., excessive rainfall). Therefore, intervals between sprays are not well understood.

Dates of application (in day of year, DOY) are shown in a series of charts for major crop groupings below (cotton, melons of all types, and winter vegetables). For cotton, the earliest and latest sprays of buprofezin are 16 June (DOY = 167) and 23 October (DOY = 296), respectively, although sprays during these two months are uncommon. The average and median application dates are 9 and 8 August (DOY, 221 & 220), respectively. Whiteflies in cotton are typically most troublesome during the months of July and August, though buprofezin is also in follow-up sprays made in September after the usage of other compounds for whitefly control. Whitefly control during the boll-opening period is critical due to the risks of excessive sugar deposits (honeydew excreta) that potentially contaminate lint and render it undesirable, if not completely unmarketable.

**Fig. 1. Distribution of Buprofezin Applications to Cotton by Day of Year (1996–2012)**



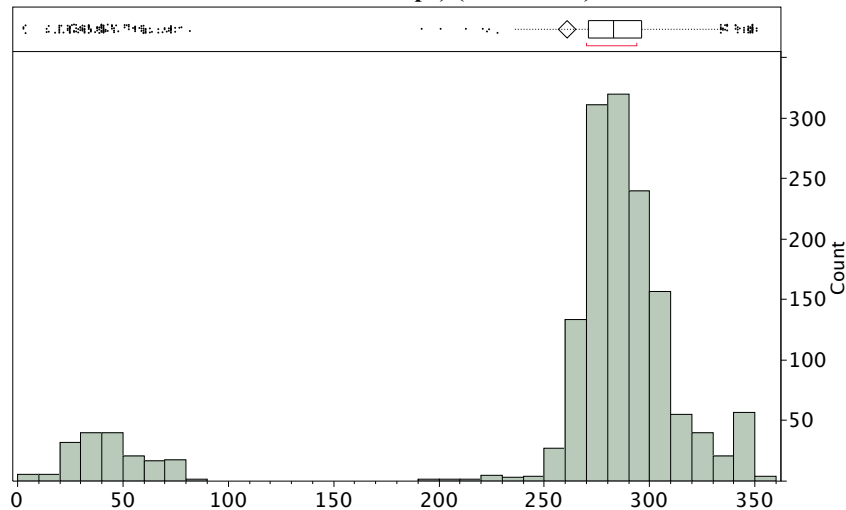
**Fig. 2. Distribution of Buprofezin Applications to Melons by Day of Year (All types) (1998–2012)**



Applications in melons are designed to control whiteflies (*Bemisia tabaci*, Biotype B). Arizona has two cropping seasons for melons, spring and fall. Over time and due to market pressures, there has been less and less separation of these two growing seasons. In addition, watermelons extend throughout the middle of the summer. Finally, since 2006, Cucurbit Yellow Stunting Disorder Virus (CYSDV) has become a key pest of cantaloupes and is vectored by whiteflies. This makes vector control even more important and has dramatically lowered thresholds for whitefly control, especially in fall melon crops when the virus is ubiquitous. Buprofezin is part of a larger program to help manage whiteflies in multiple crops including cotton and this serious crop disease.

Other vegetable crops are planted starting in the late summer and throughout the fall and winter. Whiteflies are a major problem in summer and fall crops. So control during plant establishment and early plant development is critical to the production of high value, fresh produce. Missteps in whitefly control can lead to delays in plant development that risk growers failing to meet critical marketing windows. Most sprays in winter vegetables are late in the year, October onward (DOY > 273). As days and nights cool, whiteflies are less prolific and grow much more slowly. This is shown in the relatively fewer number of buprofezin sprays in December–February (DOY > 334).

**Fig. 3. Distribution of Buprofezin Applications to Winter Vegetables by Day of Year (mainly Lettuces & Cole Crops) (1998–2012)**



6) During registration review, the Agency anticipates the need to conduct a comprehensive ecological risk assessment.

Buprofezin is a model for selective use of chemical insecticides in combination with biological control (Naranjo & Ellsworth 2009b). Extensive work has been done in the cotton system of Arizona to confirm the selectivity of buprofezin and its safety on natural enemies and other non-target organisms (Naranjo & Ellsworth 2009a, b). Buprofezin and other selective chemistries have been the focal point for Extension programs in Arizona that promote their use over broad-spectrum, neurotoxic alternatives (Ellsworth et al. 2006, 2011a,b, 2012). Growers also participate in a unique cross-commodity resistance management program to protect this and other key active ingredients throughout Arizona agriculture (Palumbo et al. 2003).

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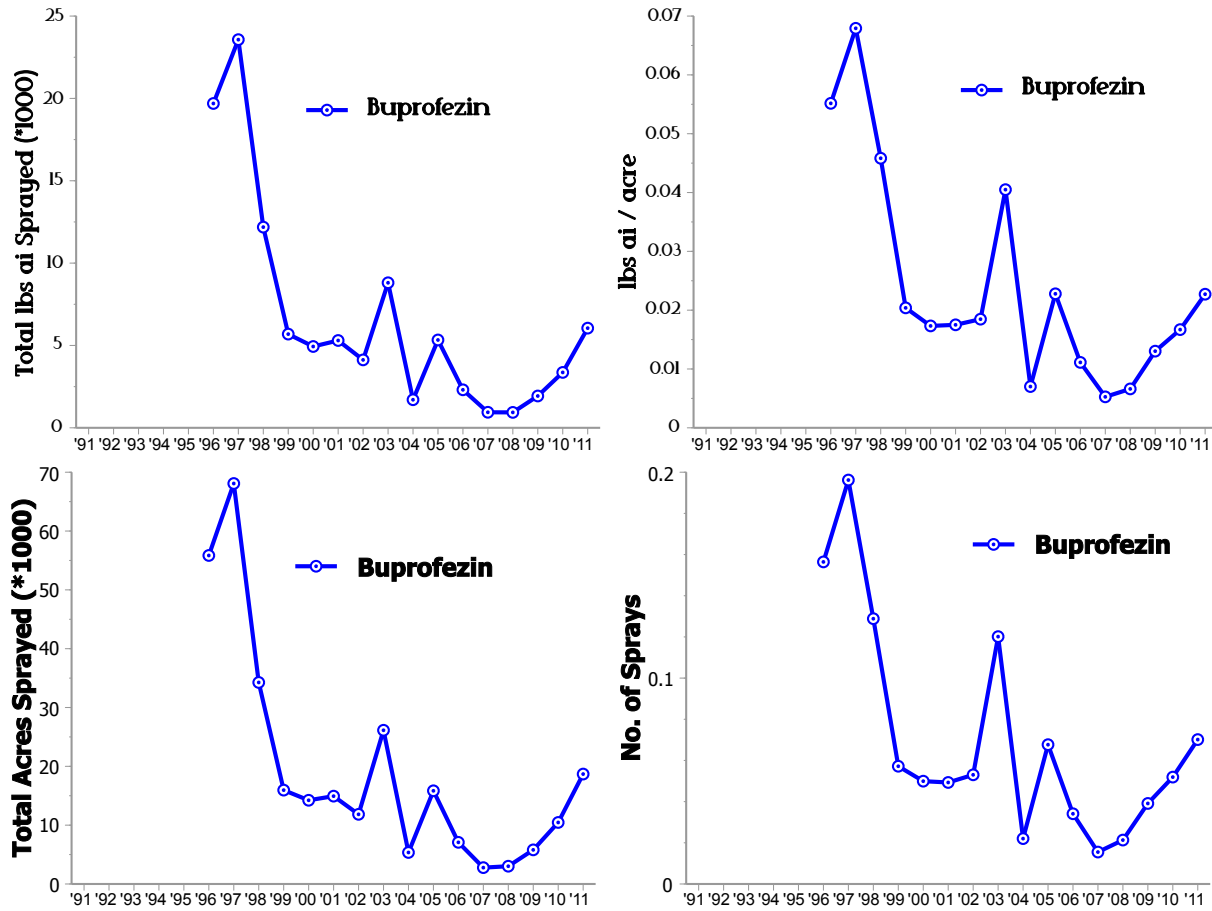


Fig. 4. Buprofezin use in cotton in Arizona, 1996–2011, in total lbs ai used statewide, lbs ai per acre, total acres sprayed and number of sprays per acre.

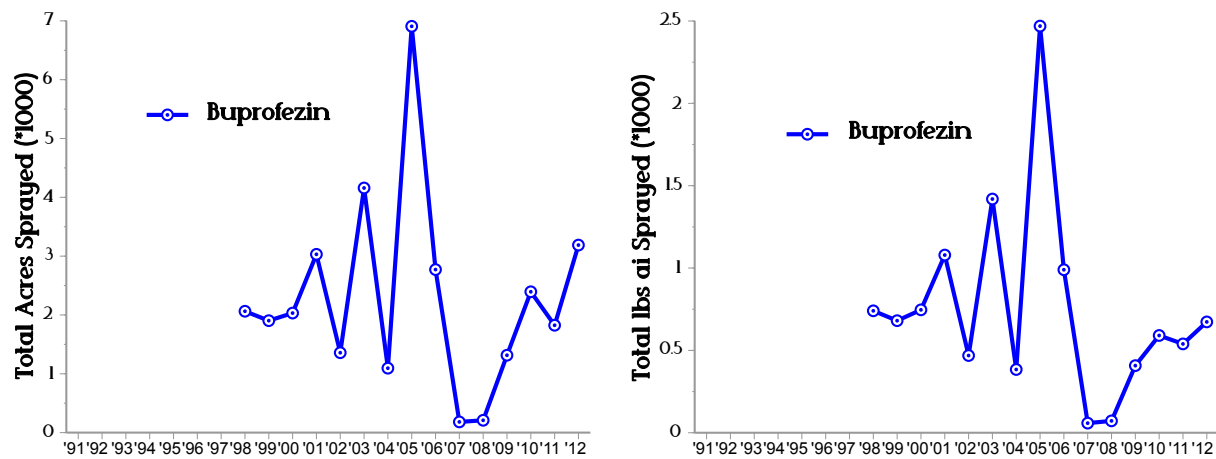


Fig. 5. Buprofezin use in melons (cantaloupes, honeydews, watermelon, all melons) in Arizona, 1996–2012, in total acres sprayed and in total lbs ai used statewide.