Welcome to AG-ASSIST, a WSDA-sponsored Listserv that is dedicated to chemigation, fertigation, irrigation practices, pesticide use, and related topics.

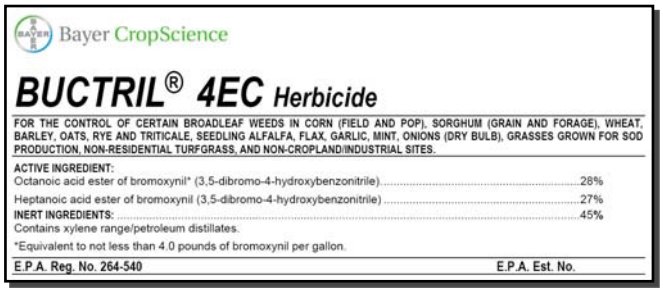
July 03, 2007

Chemigation and Fertigation Technical Assistance Program

Bromoxynil Reclassified

The Department of Agriculture initially classified bromoxynil (Buctril®, Bayer CropScience) as a low volatile ester formulation. Given this designation, pesticide applications that contain bromoxynil were subject to cutoff dates and to "prohibited use" areas in all of Benton County and regions within Franklin and Walla Walla Counties.

The reclassification was based on a reassessment of bromoxynil's chemical structure and vapor pressure, which is significantly lower than the vapor pressures of low volatile ester formulations characteristic of phenoxy products. A determination was made that an unlikely probability exists in that bromoxynil would move from the site of application in a vapor form.


Bayer CropScience

BUCTRIL® 4EC Herbicide

FOR THE CONTROL OF CERTAIN BROADLEAF WEEDS IN CORN (FIELD AND POP), SORGHUM (GRAIN AND FORAGE), WHEAT, BARLEY, OATS, RYE AND TRITICALE, SEEDLING ALFALFA, FLAX, GARLIC, MINT, ONIONS (DRY BULB), GRASSES GROWN FOR SOD PRODUCTION, NON-RESIDENTIAL TURFGRASS, AND NON-CROPLAND/INDUSTRIAL SITES.

ACTIVE INGREDIENT:
Octanoic acid ester of bromoxynil* (3,5-dibromo-4-hydroxybenzonitrile) 28%
Heptanoic acid ester of bromoxynil (3,5-dibromo-4-hydroxybenzonitrile) 27%
INERT INGREDIENTS: 45%
Contains xylene range/petroleum distillates.
*Equivalent to not less than 4.0 pounds of bromoxynil per gallon.

E.P.A. Reg. No. 264-540 E.P.A. Est. No.

To that end, the Department concluded that pesticides containing bromoxynil as the only active ingredient will not be subject to cutoff dates as is currently stipulated in the phenoxy rules. However, rules relating to the bromoxynil as a "Use Restricted" pesticide remain in effect. These restrictions include wind conditions, inversions, air temperature, and nozzle size and operating pressure, along with aircraft-specific limitations.

Pesticide Use on Timothy Hay

Because few pesticide labels explicitly reference Timothy hay as a use site, growers have expressed their uncertainty as to which pesticide products can be used on stands intended for hay production. The selection is seemingly limited because pesticide labels typically reference use sites as grass hay, grass pasture, rangeland, fallowland, or Conservation Reserve Program (CRP) – but not specifically Timothy hay.

Does a grazing provision on a label allow use of a product on a Timothy stand that is intended for hay production? A grazing provision, in and of itself, is insufficient to permit the use of a pesticide on a Timothy hay crop. A label must specifically reference cutting for hay. This use condition generally appears as a pre-harvest interval restriction in a "Grazing and Haying Restrictions," "Restrictions and Limitations for Use," "Livestock Feed Restrictions," or an analogous section of the pesticide label.

For example, Unison® (Helena Chemical Company, EPA Reg. No. 5905-542) contains the following use provision under "Livestock Feed Restrictions" in the Grass Pastures section of the label (Figure 1): "Do not cut treated grass for hay within 30 days of application." This condition of use would allow Unison® to be applied with the intent to harvest the Timothy stand as hay, contingent on a 30-day pre-harvest interval.

GRASS PASTURES

To control many emerged broadleaf weeds, apply 1.0 - 4.0 pints **UNISON®** per acre. Addition of a nonionic surfactant usually improves weed control. Preferred timing is in the early spring when sufficient weeds have emerged, and when weeds are small and actively growing, but before weeds are too mature. Summer applications to older, drought-stressed weeds are less effective. However, weeds are more susceptible again in the fall when cooler, wetter conditions support active growth before a killing frost. For fall treatment of mature weeds or perennial weed regrowth, use 3.5 - 8.0 pints per acre. Several seasons of spring plus fall treatments may be necessary to control certain perennials.

Plant Response: Injury may result to bent grass, other warm season or southern grasses, and alfalfa, clover or other legumes. Do not use if this risk of injury is unacceptable. Clovers may recover from early spring applications. If grass seed production is desired, do not apply when grass is in boot to milk stage or after heading begins. Do not apply to newly seeded areas until grass is well established. Reseeding is not recommended for at least 30 days following application. Addition of a surfactant may increase the risk of injury to newly seeded grasses.

Livestock Feeding Restrictions: Do not graze dairy animals on treated areas within 7 days after application. Do not graze meat animals on treated areas within 3 days before slaughter. Do not cut treated grass for hay within 30 days of application.

Figure 1. Conditional haying provision on Unison pesticide label.

The reason for the distinction between grazing and cutting for hay has to do with residue tolerances for foodstuff and feedstuffs. To establish a tolerance on grass grown for hay, residue studies must be performed to determine whether or not the drying process will concentrate the pesticide residue. If the label allows cutting for hay, one may safely assume such studies have been performed. Without such a provision, one cannot make such an assumption, and the product cannot be used.

Field Postings – When to Start, When to Stop

If a pesticide requires that a field be posted, it will appear in the "Agricultural Use Requirements" section of the label, commonly known as the Worker Protection Standard section. Posting requirements apply if you have employees, other than immediate family members. Notification requirements also apply in the event of contractual arrangements (e.g., irrigation company employees asked to repair an irrigation system). If authorized for chemigation, additional field posting will be required for Category 1 pesticides, which display the signal words "Danger-Poison" or "Danger."

Some pesticide labels require dual notification; that is, in addition to verbally notifying workers of the application, field posting must also occur. The label will specify what must appear on the field posting. One item that will always be required is the date and time of application. Commonly, applicators presuppose that this means only the start time and start date, but both are required.

WSDA has determined that the intent of the label is to require both the start time/date and the end time/date. This interpretation is consistent with the record keeping requirements in the General Pesticide Rules (WAC 16-228-1320[1][c]). Thus, when posting is necessary, please remember to record the beginning and ending times and dates for the pesticide application.

Triticale – It Has Its Own Identity

Presumably, if a pesticide tolerance has been established for wheat, barley, oats, rye, or any other commodity comprising Crop Group 15: Cereal Grains, then that pesticide product could be used on triticale as well. That may have been true prior to the Food Quality Protection Act of 1996. This Act required USEPA to reassess all of the pesticide tolerances that were in place in August 1996 to ensure that they met current safety standards and were supported by sound science.

Even though a pesticide product is registered for use on wheat or rye, to be used legally, triticale must be specifically listed on the pesticide label. As a case in point, although Cerone® (Bayer CropScience, EPA Reg. No. 264-377; Figure 2) is registered for use on wheat and barley, it cannot be used on triticale, since this crop (as a use site) is not explicitly listed.

Nevertheless, if a residue tolerance has already been established for wheat, it should not be too difficult to convince a product registrant to amend a Section 3 label to add triticale. In fact, 40 CFR 180.1(g) notes that tolerances and exemptions established for wheat also correspond to triticale.

Bayer CropScience

CERONE® brand ETHEPHON Plant Regulator

For Reducing Lodging in Barley and Wheat

For Agricultural or Commercial Use Only. Not For Residential Use.

ACTIVE INGREDIENT: Ethephon (2-chloroethyl) phosphonic acid* 39.9%

INERT INGREDIENTS: 60.1%

*Contains 4 pounds ethephon per gallon

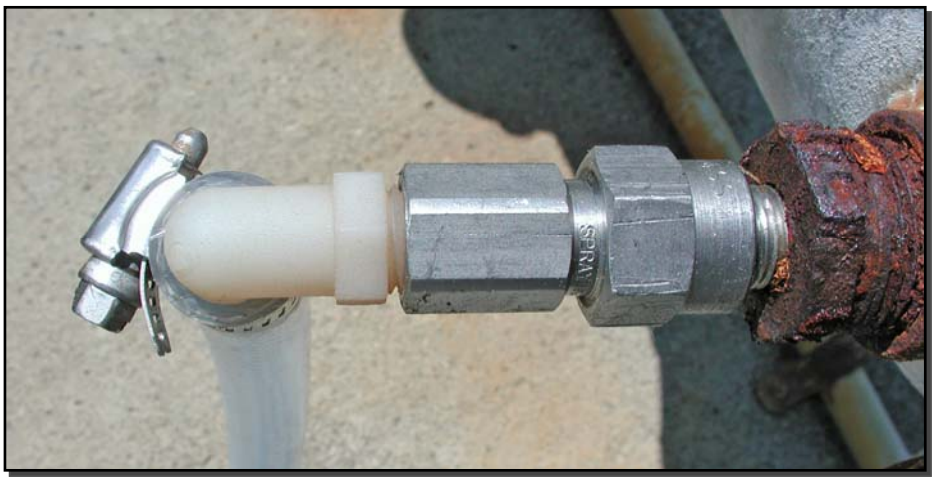
EPA Reg. No. 264-377 EPA EST NO. 264-PA-01

Figure 2. Plant regulator product not approved for triticale.

Still Showing Up . . . and Still Illegal

More than four years ago, a valve was commonly being used as an injection line check valve. Manufactured by Ag Spray Systems, that valve was neither designed for nor intended for use as an injection line check valve, but was intended for use as a control valve in spray wands. To alert industry about the inappropriate use of the valve, a WSDA Technical Advisory Bulletin was distributed. Since then, the valve faded from use, only to reappear again this season.

Both the Washington State Chemigation Rule and Fertigation Rule require that injection line check valves must have, at a minimum, 10-psi opening (cracking) pressure, and that the components must be chemically compatible with injected materials. These provisions also appear on pesticide labels for products authorized for chemigation.



Furthermore, any device used in conjunction with a chemigation or fertigation injection apparatus must be accompanied with manufacturer's instructions, which detail the device's proper installation and guidelines for its appropriate maintenance. The Ag Spray Systems valve fails to comply with any of the provisions on the pesticide label or in State rule. Thus, use of this device as a valve constitutes a violation of the pesticide label and of State rule.

When Things Go Awry . . . And They Undoubtedly Will

To quote a maxim: "If things can fail, they invariably will fail." This tidbit of wisdom also applies to irrigation mainline check valves.

To ensure proper operation, backflow safety devices should be inspected before each chemigation or fertigation application. It is the responsibility of the applicator of record to ensure the proper operation of these devices (WAC 16-202-1003[4] and WAC 16-202-2003[4]) and that backflow will not occur (WAC 16-202-1003[7] and WAC 16-202-2003[6]). The applicator of record is also obligated to ensure that the backflow devices are operated and maintained in accordance with the manufacturer's specifications, established industry standards, and department rule (WAC 16-202-1003[14] and WAC 16-202-2003[12]).

Figure 3. Malfunctioning irrigation mainline check valve.

To assess the integrity of the irrigation mainline check valve, the Chemigation Rule and Fertigation Rule require that an inspection port or access point be installed immediately upstream of the check valve. The port must be of sufficient size to allow the operator to manipulate the check valve to assess it for proper operating condition.

Recently, while conducting a system inspection, a cursory look at the chemigation valve did not give cause for concern (Figure 3). However, inspecting the swing valve revealed a problem of great concern (Figure 4). Although the system was currently being used to fertigate, the system operator was unable to approximate a timeframe in which the swing valve was last checked. Nonetheless, the operator did relate a lingering concern with a 10-psi drop in system operating pressure. The causal factor was now identified.

Figure 4. Failed swing check valve.

As an antipollution device, the irrigation mainline serves a critical function in protecting the water source from contamination events. Whether due to its absence or to its malfunction stemming from inadequate maintenance, the net

result can be considerable: crop damage, illegal crop residue, human health risks, or environmental degradation. Remember to assess the integrity of backflow devices prior to the start of every chemigation or fertigation application.

Knobby Potatoes and ET . . . When More is not the Solution

There is probably no other crop that is more sensitive to improper irrigation water management than that of potatoes. Deficit irrigation can reduce the number of tubers, produce undesirable tuber shapes, and increase the potential for disease infection. Over-irrigation can induce nutrient deficiencies and increase disease potential. Listed below are a few maladies induced by poor irrigation water management.

- Continuous water stress produces small or cucumber-shaped potatoes.
- Periodic water stress produces pointed end, dumbbell, knobby, and bottlenecked potatoes.
- Widely fluctuating soil water availability is associated with growth cracks.
- In addition to increasing the proportion of rough, misshapen tubers, early season (tuber initiation and early tuber development) water stress can reduce specific gravity and increase the incidence of translucent end.
- Water stress during stolonization and tuber set reduces the number of tubers.
- Over-irrigation can leach water-soluble plant nutrients from the rooting zone, potentially resulting in nitrogen-deficient plants and an increased hazard to ground water.
- Over-irrigation during vegetative growth and tuber initiation increases the potential for developing brown center and hollow heart.
- Saturation of the soil profile for more than 8 to 12 hours can cause root damage due to anoxia, the lack of oxygen which is required by roots for normal respiration.
- Tubers that are turgid (internal water pressure in plant cells) as a result of high soil water content at harvest are more susceptible to shatter bruise and thumbnail cracking.
- Poor distribution uniformity can host a medley of plant diseases.
    - Water stress: potato early dying (*Verticillium*), early blight (*Alternaria*), black dot (*Colletotrichum*), and common scab (*Streptomyces*).
    - Excess water: Blackleg (*Erwinia*), dry rot (*Fusarium*), early blight (*Alternaria*), and pink rot (*Phytophthora*).

In addition to yield and quality, poor water application uniformity can significantly affect pesticide efficacy due to poor pesticide placement within the plant canopy, or, because of over application, it may result in crop damage or illegal pesticide residue. Poor distribution, evident as variable water application depths, can arise from malfunctioning pressure regulators, improperly sized or worn sprinklers, unsuitable sprinkler package, system leaks, machine movement, and field topography.

The enormous economic implications of poor application uniformity are detailed in the University of Idaho publication *Irrigation Uniformity* (King, B.A., Stark, J. C., and Kincaid, D.C., Bulletin 824, University of Idaho, Cooperative Extension, 2000). Decreases in tuber yield and in tuber quality were incurred with a mere 10 percent departure in seasonal irrigation water application from the seasonal evapotranspiration (ET) rate. As illustrated in Figure 5, over- and under-irrigation adversely impacted yield to a comparable degree.

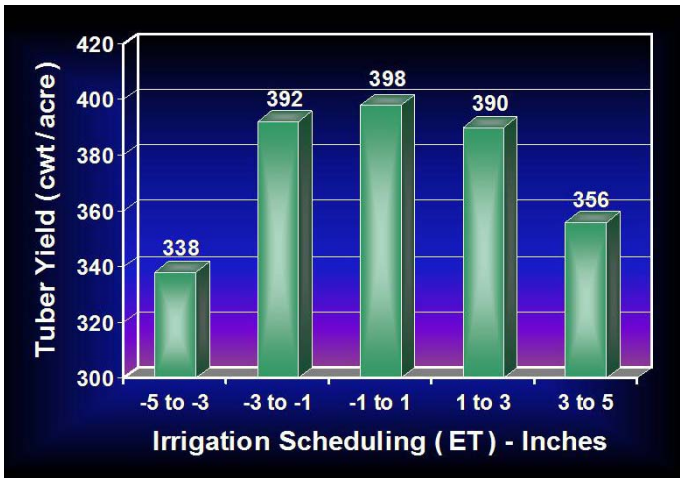


Figure 5. Potato yield as influenced by difference in irrigation and seasonal evapotranspiration (ET).

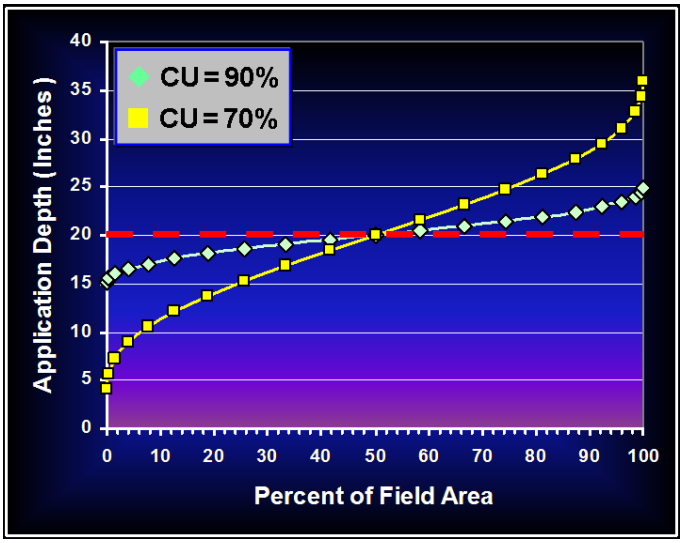


Figure 6. Seasonal water application depth for two levels of irrigation uniformity by field area covered.

Irrigation uniformity describes how evenly an irrigation system distributes water over an area. Christiansen uniformity coefficient (CU) is the most common quantitative measure of irrigation uniformity.

As illustrated in Figure 6, lower CU values result in greater deviations from the average application depth (20 inches), which is represented by the extreme differences in water application depth between a CU valve of 70 percent and a CU value of 90 percent.

For example, with an irrigation system CU of 70 percent, 20 percent of the field will receive 13.9 inches of water, compared to zero percent of the field area when irrigated at a CU value of 90 percent (Figure 6). Moreover, 34 percent of the field area will be over-watered by more than three inches (23 inches), with an equal area under-watered by the same amount (17 inches), as compared to nine percent with a CU value of 90 percent.

Given that a larger portion of a field would experience over- and under-irrigation with a lower system uniformity, one would assume that total yield (and tuber quality) would progressively decrease along with a corresponding increase in variability. In fact, this is the case. With reference to Figure 6, maximum yield (±3 inches of ET, Figure 5) is expected to occur on 34 percent of the field irrigated with a system having a CU of 90 percent but only on 10 percent of the field when the irrigation system has a CU of 70 percent.

The cumulative economic effect of poor irrigation uniformity on total yield and tuber quality is represented in Table 1. The estimated increase in gross receipts realized from increasing the CU value of an irrigation system from 70 to 90 percent is $144 per acre.

Table 1. Estimated irrigation uniformity effects on yield, grade, and gross receipts for Russet Burbank.[1]

Irrigation Uniformity	Yield (cwt/acre)			Incentive	
				Adjusted Price	Gross Receipts
	Total	U.S. No. 1s	7 to 14 ounce	$/acre	$/acre
70%	362	241	121	4.74	1,716
90%	385	261	124	4.83	1,860
Difference	23	20	3	0.09	144

[1] Data collected from 45 commercial potato fields in southeastern Idaho, 1995.

In closing, research reported in this publication dispels a common misconception, and practice. Specifically, areas in a field receiving deficit irrigation can be reduced or mitigated by additional irrigation. Evidently, total production will not increase because of the over-irrigation that occurs on other areas within the field, resulting in reduced yield. Other practical concerns involve the potential for disease infection, undesirable tuber shapes, and ground water contamination. Clearly, poor system performance cannot be compensated for with more irrigation water.

Comment Period Extended on Soil Fumigants

It should be common knowledge that USEPA is in the final stages of the public participation process involving the reregistration eligibility decision of several soil fumigants. Currently, USEPA is seeking public comment on possible human health risk mitigation options for the soil fumigants chloropicrin (e.g., Telone C-17 and C-35, Terr-O-Gas, Tri-Con), methyl bromide, and, of particular interest to the chemigation industry, the MITC-generating fumigants: metam sodium (e.g., Vapam HL, Metam CLR 42%, Sectagon 42), metam potassium (e.g., K-PAM HL), and dazomet (e.g., Basamid, UltraFume, Super-Fume).

Appreciating the agricultural benefits of soil fumigants, USEPA also recognizes the human safety risk posed to bystanders. Bystanders are people who are not involved in the fumigant application but who live, work, or are located in nearby areas where they may be exposed to airborne emissions originating from the application site. Bystanders include agricultural workers in nearby fields who are not involved with the fumigant application. Incidents of bystander exposure confirm that fumigants have the potential to move off-site at concentrations which produce adverse health effects in humans.

To ensure that pesticides meet current health and safety standards, USEPA is proposing several human health mitigation measures to address bystander and occupational exposures from soil fumigant applications, which are intended:

- To directly reduce potential acute inhalation and other risks, and
- To facilitate and ensure compliance, enforcement, and applicator planning.

Public input is being requested on these risk mitigation options. USEPA has compiled a series of questions for the public to consider in preparing comments. A fact sheet that summarizes the USEPA risk mitigation options including the list of questions is available at http://www.epa.gov/oppsrrd1/reregistration/soil_fumigants/rmo_handout.pdf.

The comment period was recently extended. USEPA must receive the comments by September 3, 2007, which can be submitted by mail or on-line by linking to “Regulations.com”: http://www.epa.gov/oppsrrd1/reregistration/soil_fumigants/risk_mitigation.htm#docket.

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