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POTATO EYES
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Outlook Herbicide: Application and properties

Outlook, dimethenamid-P, is a BASF product labeled in 2005 for weed control in potato. It is to be used pre-emergence to potato. It is formulated as a liquid that is to be applied pre-emergence or pre-plant incorporated and controls weeds that are pre-emergent or emerging. The use-rate in potatoes falls into two rate ranges depending upon soil texture, 12 to 18 fl oz/A in coarse-textured soils or 18 to 21 fl oz/A in medium- or fine-textured soils. Outlook can only be applied on potato once during season. It can be applied by ground, air or chemigation. Outlook can be impregnated on dry fertilizer and applied. Outlook is more soluble than Chateau but has not been found below 4 inches in the soil. If after application there is insufficient rain for incorporation, use a sprinkler to incorporate using sufficient water to move herbicide into the top one to two inches of soil. Mechanical incorporation is not recommended but is labeled. Loss due to volatilization is minimal. Outlook should be incorporated as soon as possible but it is not susceptible to photo-degradation. According to the Outlook label, incorporation should occur within 7 days after application (Figure 1). The re-entry interval (REI) is 12 hours and the personal protection equipment (PPE) is long-sleeved shirt, long pants, chemical-resistant gloves, shoes and socks, and eye protection.

Mode of Action and Weed Spectrum

Outlook has a different mode of action than Chateau and affects susceptible weeds by inhibiting synthesis of very long chained fatty acids, thus preventing root and shoot growth. It controls susceptible weeds before or soon after emergence. Dual Magnum (s-metolachlor) and Stalwart (metolachlor) are in the same chemical family as Outlook and have the same mode of action.

Weed Control

Many weeds are listed on the Outlook label as "controlled," and include hairy, cutleaf, eastern black, and black nightshade; redroot, prostrate, smooth, and tumble pigweed; common purslane; barnyardgrass; green, yellow, and giant foxtail, and witchgrass. Outlook has provided significantly better hairy nightshade control than Dual Magnum or Stalwart in many trials. Results also indicate suppression of volunteer grains, wild oat, and common lambsquarters. The tank-mix partner(s) to use with Outlook will depend upon weeds in your field that Outlook will not control or only will suppress (Table 1). It can be tank-mixed or sequentially-applied with many herbicides labeled for potato.

Outlook is labeled for use in other crops that may be in rotation with potato such as sugar beet, corn, dry bean, and onion. Growers who have the option of using Outlook on more than one crop in their rotation should carefully consider the risk of developing herbicide-resistant weed populations. There are at least two choices for delaying or preventing this: 1) use a herbicide mode of action only once every two or more years, never in the same or consecutive years, and/or 2) tank-mix herbicides with different modes of action but with control of the same target weed(s). Weeds not controlled by one mode of action may be controlled by the other mode of action. Other Integrated Pest Management (IPM) strategies also should be used in conjunction with herbicide mode of action rotation and tank-mixing for herbicide resistance management.

Potato Tolerance

Russet Burbank, Russet Norkotah, Ranger Russet, Shepody, Bannock Russet, and Alturas were not affected by Outlook rates as high as 27.4 fl oz/A in herbicide tolerance trials. Since Outlook is readily soluble in water, it is more available for uptake by potato roots and shoots in high compared with low soil moisture conditions. If cool, wet conditions persist after Outlook application, potato plants may not be able to metabolize the amount of herbicide absorbed, and injury, such as leaf crinkling and stunting, may occur. As

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soon as temperatures rise to normal levels, the potato plant begins growing more rapidly, resulting in adequate herbicide metabolism and no visible damage on new growth (Figure 2). When this type of early injury occurred, tuber quality and yields were reported not to be affected. Potato crop tolerance to Outlook is high, although cool, wet spring conditions may result in early injury. Note if for some reason the potato crop fails to emerge due to weather, etc., re-planting of that field with potato is not recommended.

Crop Restrictions

The only plant-back restriction listed on the Outlook label is that four months must pass before a fall-seeded cereal crop can be planted. Outlook is labeled for use in several crops: sugar beet, corn including sweet and pop, dry bean, dry bulb onion, dry bulb shallot, garlic, grain sorghum, green onion, horseradish, peanut, soybean, and perennial grasses grown for seed.

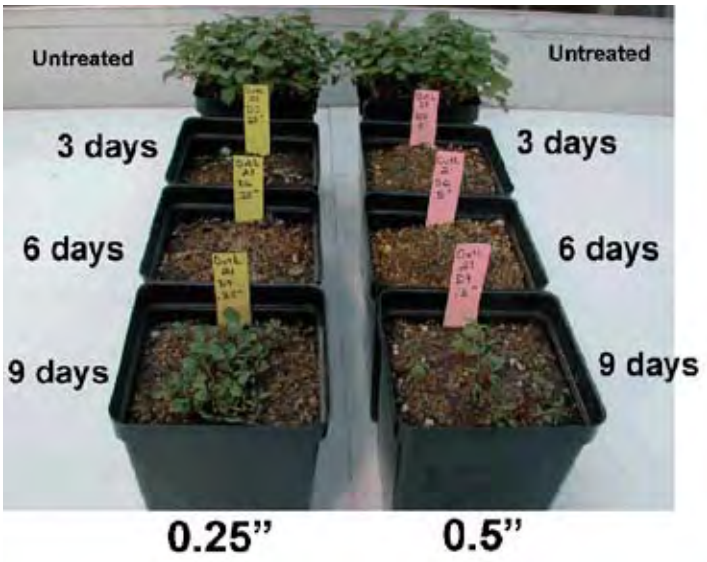

Figure 1: Outlook applied at 21 ounces, watered with 0.25 or 0.5 inches at 3, 6 and 9 days after planting. Photos taken 17 days after planting. Weed: Redroot pigweed. (KayJay Ag Services, NDSU Greenhouse).

Table 1. Outlook efficacy on weed control in Scottsbluff, NE, 2003 and 2004. (Trial was conducted with Dr. R. Wilson.)

2003:	Hairy Nightshade	Redroot pigweed	Common lambsquarters	Common purslane	Toothed spurge	Visual injury
Product	% control on August 1					0-100%
Outlook	99	85	81	52	48	0
Outlook +Sencor	99	99	99	81	99	6
Outlook +Prowl	99	99	99	88	76	1
2004	Hairy nightshade	Redroot pigweed	Common lambsquarters	Common purslane	Common cocklebur	Visual injury
Product	% control on July 6					0-100%
Outlook +Sencor	65	81	66	82	99	0
Outlook +Prowl	86	42	65	89	99	0
Rates as active ingredient were Outlook @ 0.64 lb/a; Outlook @0.64 lb/a plus Sencor @ 0.5 lb/a, and Outlook @ 0.75 lb/a plus Prowl @ 1 lb/a						
Visual injury on potato reported here was taken on June 17; rating was 0, meaning none, to 100, meaning 100 plants were dead.						

Chateau Herbicide: Application and Properties

Chateau, flumioxazin, is a Valent product labeled in 2005 for weed control in potato. It is formulated as a water-dispersible granule (WDG) and it can only be applied pre-emergence to the potatoes at 1.5 oz/A. The best application timing is shortly after a hilling operation performed just prior to potato emergence. According to the Chateau label, a minimum of 2 inches of soil must cover the vegetative portion of the potato plant at application time or crop damage can occur. It can be applied by ground or air, but not by chemigation. Chateau cannot be impregnated on dry fertilizer and applied to potato. Chateau has very low mobility in soil and is less water soluble than Outlook. If adequate rainfall has not occurred soon after application, incorporate with a sprinkler to move the herbicide into the top one to two inches of soil. Mechanical incorporation is not recommended as reduced weed control could result. Loss due to volatilization is minimal. Immediate incorporation of Chateau is not required, but it is somewhat susceptible to photo-degradation.

Mode of Action

Chateau affects susceptible plants by inhibiting protox, an enzyme involved in chlorophyll synthesis. No other herbicides with this mode of action are currently available for use in potato. Chateau should be used mainly to manage hairy nightshade. The Chateau label lists weeds as "suppressed" only, so Chateau should be tank-mixed for broad spectrum weed control and herbicide resistance management.

Weed Control

At its relatively low rate, Chateau will not provide control or suppression of any grassy weeds. Weeds present in a potato field other than hairy nightshade will dictate what other herbicides should be included in the tank-mix. Hairy nightshade should be the weed targeted with Chateau with an appropriate two- or three-way tank mixture providing control of other weeds. Chateau has performed well in potato weed control trials when combined in 2-way tank-mixtures with Sencor (metribuzin), Matrix (rimsulfuron) (Table 2), or Outlook, or in 3-way tank mixtures with these and most other pre-emergence potato herbicides; e.g. Eptam (EPTC), Dual Magnum (s-metolachlor), or Prowl 3.3 EC or Prowl H20 (pendimethalin).

Potato Tolerance

If Chateau is applied to exposed potato vegetation, injury can occur, and injury such as chlorosis, leaf crinkling, and stunting has been observed. However, even though early injury was observed on Russet Burbank (Figure 2), Russet Norkotah, Ranger Russet, and Shepody, U.S. #1 and total tuber yields were not reduced by Chateau applied pre-emergence at one to four times the use rate. Yield reduction has been noted when temperature was unusually high before row clo-

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Table 2. Chateau in tank-mixes efficacy on weed control in Aberdeen, ID, 2005. (Trial was conducted by Dr. P. Hutchinson.)

Chateau @ 1.5 oz/a tank mixed with	Hairy nightshade	Redroot pigweed	Common lambsquarter
	% season-long control		
Sencor @ 0.66 lb/a	95	98	100
Eptam @ 4.5 pt/a	98	77	78
Prowl H2O @ 2.1 pt/a	92	75	98
Dual Mag @ 1.4 pt/a	93	80	92
Matrix @ 1.5 oz/a	100	100	100

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sure on treated fields. This is thought to be the effect of heat stress on plants coping with some herbicide injury. Since these varieties were tolerant of very high Chateau rates, the low use-rate of 1.5 oz/A would seemingly lessen the risk of negatively impacting yields.

Cropping Restrictions

The Chateau label has the following plant-back restrictions:

1. Four months for fall-seeded cereal crops (winter wheat et al.),
2. (if tilled pre-plant) Eight months for alfalfa, canola, clover, oats, or sugar beets,
3. (no-till) Twelve months for alfalfa, canola, clover, oats, or sugar beets.

Figure 2: Potato injury due to late application of Chateau.

The Nebraska Potato Eyes
is on the World Wide Web at:
www.panhandle.unl.edu/peyes.htm