

New Herbicides for Weed Management in Potato Production

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Weeds reduce potato yield and quality and the cost of controlling weeds increases the overall cost of potato production. More potato acres in the U.S. are treated with the herbicide metribuzin (Sencor) than any other pesticide (Guenthner et al. 1999). The annual value of metribuzin to U.S. potato growers is estimated to be \$81 million (Guenthner et al. 1999). Although metribuzin is still the primary herbicide used in potato production, several weed species are not consistently controlled by metribuzin and occurrence of metribuzin resistant weed biotypes has increased (pigweed sp., common lambsquarters, and kochia). Some potato varieties are sensitive to metribuzin, limiting its use to only those varieties that are tolerant.

Several new herbicides; dimethenamid-p (Outlook), sulfentrazone (Spartan), and flumioxazin (Chateau) will be labeled for use in potato in 2005. All three herbicides control hairy and black nightshade, two weeds commonly missed in potato weed management programs. These three herbicides have been tested over several years in potatoes for crop tolerance and weed control at three locations representing major potato growing regions in Idaho, Oregon, and Washington State. Trials were conducted under sprinkler irrigation on a Delco loam soil with 1.4 % organic matter, pH 8.1 in Aberdeen, ID, Owyhee silt loam soil, 1.5 % organic matter, pH 7 in Ontario, OR, and on a Quincy sand soil, 0.5 % organic matter, pH 7 near Paterson, WA. In all three locations herbicides were applied after the final hilling and prior to potato and weed emergence, and sprinkler incorporated with 0.5 to 0.75 inch of water.

Dimethenamid-p (Outlook). Dimethenamid-p has a similar mode of action and controls a similar spectrum of weeds as s-metolachlor (Dual Magnum). Dimethenamid-p applied preemergence controls most annual grass weeds: barnyardgrass, crabgrass, yellow foxtail, green foxtail, and suppresses longspine sandbur and wild proso millet. Dimethenamid-p also controls some small-seeded broadleaf weeds; hairy and black nightshade, pigweed sp., and purslane. Common lambsquarters is suppressed, while kochia, and Russian thistle are not controlled well with dimethenamid-p alone. Including dimethenamid-p in tank mixtures with other potato herbicides improves control of common lambsquarters and kochia. Dimethenamid-p provides good broad spectrum weed control in tank mixes with metribuzin (Sencor), rimsulfuron (Matrix), trifluralin (Treflan), pendimethalin (Prowl), or EPTC (Eptam).

All major potato varieties grown in the PNW have shown good tolerance to dimethenamid-p. Dimethenamid-p can be applied by ground, aerial, or chemigation. Dimethenamid-p soil persistence tends to be slightly less than that of s-metolachlor (Dual Magnum). The only plant-back restriction after use of dimethenamid-p in potatoes is that four months are required from the last application of dimethenamid-p before planting fall-seeded cereal and grass seed crops. Dimethenamid-p is also labeled for use in corn, dry beans, grass grown for seed, onion, and sugarbeets.

Sulfentrazone (Spartan). Sulfentrazone for use in potatoes is formulated as 75DF will not be readily available for the 2005 season. Sulfentrazone inhibits protoporphyrinogen oxidase, an enzyme important in the chlorophyll synthesis pathway. This represents a new mode of action for potato herbicides and as a result, provides growers with a new tool to manage herbicide resistant weeds. PNW weed control research results show that sulfentrazone applied preemergence controls many annual broadleaf weeds; pigweed sp., hairy and black nightshade, common lambsquarters, kochia, and Russian thistle. Sulfentrazone also suppresses yellow nutsedge. Growers should use the highest labeled rate for their soil type and soil pH for yellow nutsedge suppression. Sulfentrazone will control metribuzin resistant (triazine resistant) pigweed and common lambsquarters and rimsulfuron resistant (ALS resistant) kochia and Russian thistle. Grass weeds are not controlled well with sulfentrazone at most rates used in potatoes. To improve grass control, sulfentrazone should be tank mixed with metribuzin (Sencor), s-metolachlor (Dual Magnum), rimsulfuron (Matrix), trifluralin (Treflan), pendimethalin (Prowl), or EPTC (Eptam).

Sulfentrazone can be applied by ground, aerial, or chemigation. All major potato varieties grown in the PNW have shown tolerance to sulfentrazone. Some injury has been observed on potato leaves in late May and early June when using higher than labeled rates of sulfentrazone. Minor to moderate injury symptoms on leaves have not resulted in reduced tuber yields in research trials unless the potatoes were experiencing heat stress at the same time as metabolizing the herbicide after root uptake. Sulfentrazone is more soluble and available for plant uptake from the root zone when soil pH is above 7. Growers should use the lowest labeled rates for their soil types when pH is above 7. Excessive rain or irrigation after application may also move sulfentrazone into the potato root zone increasing the possibility for potato injury. Read the label for more information on sulfentrazone solubility based on soil and irrigation water characteristics and environmental conditions.

Sulfentrazone persistence in the soil is fairly long, so several crops, such as, sugarbeets, sweet corn, and pop corn cannot be planted the following spring after using sulfentrazone in potato. Sulfentrazone has also been labeled recently in mint, dry beans, and dry peas. A new PNW publication (PNW577) titled “Weed Management in Potatoes with Spartan Herbicide” is available from the extension publication offices in each state.

Flumioxazin (Chateau). Flumioxazin will be available for limited experimental use permits for the 2005 growing season. Flumioxazin has a similar mode of action as sulfentrazone and applied preemergence, controls many annual broadleaf weeds (pigweed sp., hairy and black nightshade, common lambsquarters, kochia, and Russian thistle). Nightshade species are very susceptible to flumioxazin and its use in potato will primarily be targeted as a tank mix partner to improve nightshade control. Pigweed and common lambsquarters control with flumioxazin has been less consistent in silt loam soils with more organic matter in Idaho and Oregon than in sandy soils with low organic matter in Washington State. Flumioxazin was recently labeled in mint, grapes, and nonbearing fruit trees. Similar to sulfentrazone, flumioxazin will control several herbicide resistant broadleaf weed biotypes.

As with sulfentrazone, grass weeds are not controlled well with flumioxazin at rates labeled for potatoes. For grass control, flumioxazin should be tank mixed with metribuzin (Sencor), s-metolachlor (Dual Magnum), rimsulfuron (Matrix), trifluralin (Treflan), pendimethalin (Prowl), or EPTC (Eptam).

Major potato varieties grown in the PNW have shown good tolerance to flumioxazin. Flumioxazin can be applied by ground, aerial, or chemigation. Flumioxazin persistence in soil is fairly short-lived and there are few plant back restrictions. Growers should refer to labels for proper use rates and crop rotation restrictions.

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