Potato Progress

Research and Extension for Washington's Potato Industry
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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. The annual value of metribuzin to U.S. potato growers is estimated to be $81 million. 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 have 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.

Pete Thomas Retires from USDA-ARS at Prosser

Dr. Peter Thomas, Research Plant Pathologist with USDA-Agricultural Research Service in Prosser, retired December 31, 2004, after 38 years of federal service.

Pete grew up on a cattle farm in southern Illinois and began his career as a farmer in 1952. He earned his B.S. degree at the University of Illinois in 1958, and served as a high school science teacher for 3 year in Enfield, IL. He was chosen to participate in a National Science Foundation Academic Year Institute for physics teachers at the University of Wisconsin in 1961, where he earned his M.S. degree. Continuing at Wisconsin, he earned his Ph.D. in Plant Pathology,and began his research career with the USDA-ARS in 1966 in Prosser, WA.

After an initial stint working on tomatoes and beet curly top virus, Pete was reassigned to potatoes in 1976. He identified the potato leafroll virus/insect vector cycles in the Columbia Basin, and identified methods to break these cycles and reduce disease. Later, he found that the major insect-transmitted potato viruses are not endemic in the Columbia Basin and depend entirely on the potato crop itself for survival. He discovered a tobacco rattle virus-caused disease (corky ringspot) in the Columbia Basin. His work led to the discovery that weed-free alfalfa in rotation with potatoes can rid a field of tobacco rattle virus. He developed antisera against the major potato viruses and adapted enzyme linked immunosorbent assays for detection of potato viruses. This technology is used to monitor and eliminate virus contamination in potato seed certification programs throughout the nation. His research collaboration with the Molecular Biology Group of Monsanto Co. in St. Louis, Missouri, contributed to the development of pathogen-mediated extreme resistance to potato viruses combined with transgenic resistance to Colorado potato beetle. More recently, Pete discovered a densovirus that infects the green peach aphid. This virus has great potential as a biological control agent for green peach aphid and the viruses it transmits.

Following his retirement, Pete plans to spend more time with his four children, who include a veterinarian, a registered nurse, a microbiologist, and a teacher. He plans to continue growing wine grapes, to build houses, to teach his grandchildren to bridge, to write family history, and to paddle a canoe from his riverfront farm in Washington to his riverfront farm in Illinois.

23rd Annual Western Washington Potato Workshop

Date & Time: Friday, February 25, 7:30 am to 3:30 pm

Location: Cotton Tree Inn, Mount Vernon, WA

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