Weed Control and Potato (*Solanum tuberosum*) Tolerance with Dimethenamid Isomers and Other Herbicides

Robert J. Richardson, Cory M. Whaley, Henry P. Wilson*, and Thomas E. Hines

Eastern Shore Agricultural Research and Extension Center, Virginia Polytechnic Institute and State University, Painter, VA 23420.

*Corresponding author: Tel: 757-414-0724 ext. 13; Fax: 757-414-0730; Email: hwilson@vt.edu

ABSTRACT

Two research studies were conducted to evaluate weed control in potato with dimethenamid and dimethenamid-p. No significant injury was observed from most applications of dimethenamid prior to potato emergence, but injury was 20% to 38% with dimethenamid when emerging potatoes were covered slightly by soil during “drag-off” and rain occurred within 24 h. Common lambsquarters (*Chenopodium album* L.) and common ragweed (*Ambrosia artemisiifolia* L.) control with dimethenamid preemergence (PRE) did not exceed 68%. Dimethenamid-p plus metribuzin or dimethenamid-p followed by (fb) rimsulfuron postemergence (POST) controlled common lambsquarters 95% to 96% and common ragweed 71% to 92%. Annual grass control was greater with S-metolachlor alone than with dimethenamid isomers alone. Broadleaf and grass control was similar with dimethenamid and dimethenamid-p.

RESUMEN

Se ejecutaron dos trabajos de investigación para evaluar dimethenamida y dimethenamida-p en el control de malezas. No se observaron daños significativos con la mayoría de las aplicaciones de dimethenamida antes de la emergencia de la papa, pero el daño fue de 20 a 38% cuando las papas en emergencia estuvieron ligeramente cubiertas con suelo como consecuencia del rastrillado y lluvia dentro de las 24 horas. El control del bledo (*Chenopodium album* L.) y de la ambrosia común (*Ambrosia artemisiifolia* L.) con aplicación de dimethenamida a pre-emergencia (PRE) no superó el 68%. La aplicación de dimethenamida-p más metribuzina o dimethenamida-p seguida de rimsulfuron (fb) en postemergencia (POST), controló 95% a 96% de ambrosia y 71% a 92% de bledo. El control de pasto anual fue mayor con S-metolachlor solo que con isómeros del dimethenamida solos. El control de malezas de hoja ancha fue el mismo con dimethenamida que con dimethenamida-p.

INTRODUCTION

Dimethenamid [2-chloro-N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl)acetamide] is a chloroacetamide herbicide registered for use in several field crops. In previous research, dimethenamid controlled many annual grasses including barnyardgrass (*Echinochloa crus-galli* (L.) Beauv.), foxtails (*Setaria* spp.), and large crabgrass (*Digitaria sanguinalis* (L.) Scop.), while also controlling some broadleaf weeds such as triazine-resistant smooth pigweed (*Amaranthus hybridus* L.) (Foy and Witt 1997; Mueller and Hayes 1997; Rabaei and Harvey 1997; Tonks et al. 1999). Potato tolerance to dimethenamid has varied, with preemergence applications generally resulting in less potato injury than postemergence applications (Tonks et al. 1999).

Dimethenamid-p [(S)-2-chloro-N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl)acetamide] is one of two main dimethenamid isomers. This isomer has previously shown greater activity on weeds than the R-isomer (Couderchet et al. 1997). The greater activity allows effective herbicidal use of dimethenamid-p at lower rates than that required for effective use of dimethenamid (Couderchet et al. 1997). Similar characteristics have been described for metolachlor [2-chloro-N-(2-ethyl-6-methylphenyl)-N-(2-methoxy-1-methylethyl)acetamide]
and S-metolachlor [2-chloro-N-(2-ethyl-6-methylphenyl)-N-
[(1S)-2-methoxy-1-methylethyl]acetamide] (Weed Science
Society of America 2002).

While dimethenamid and dimethenamid-p have been
evaluated for use in several crops, little information is avail-
able on potato response to, and weed control with either
herbicide. Therefore, the objectives of two studies were (1) to
determine the efficacy of and crop response to dimethenamid
when applied PRE to potatoes at several rates and (2) to com-
pare weed control programs based on dimethenamid and
dimethenamid-p with a standard herbicide program based on
S-metolachlor. In the second study programs included mix-
tures of dimethenamid, dimethenamid-p and S-metolachlor
with metribuzin [4-aminio-6-(1,1-dimethyl)-3-methylthio-
1,2, triazin-5(4H)-one] PRE, and dimethenamid-p and S-meto-
lachlor PRE, fb rimsulfuron \([N\{[4,6-dimethoxy-2-pyrimid-
idy]amino\} carbonyl\}-3-(ethysulfonyl)-2-pyridinesulfonamid
e]. Common lambsquarters, common ragweed, and large crab-
grass are prevalent in Virginia (Webster 2000, 2001); therefore,
these species were selected for evaluation.

**MATERIALS AND METHODS**

Experiments were conducted in 1996, 1997, 1999, and
2000 at the Eastern Shore Agricultural Research and Exten-
sion Center near Painter, VA. The soil type was a Bojac sandy
loam (Typic Hapludult) with 1% organic matter and a pH of 6.1.
Seedbed preparation included chisel plowing once fb tandem
disking twice. An s-tine field cultivator with double rolling basks
prepared the final seedbed. Tubers of the potato variety
‘Superior’ were cut with a seed cutter into 40-g seedpieces.
Seedpieces were planted on 25 March 1996, 18 March 1997, 9
April 1999, and 7 March 2000 with a commercial two-row
potato planter forming a 10- to 12-cm ridge over the row dur-
ing planting. Seedpieces were planted 0.3 m apart into rows
during planting. Fertilizer was applied at planting in a

---

<sup>1</sup> Teejet XR8003 flat fan nozzle (Spraying Systems Company, North Avenue, Wheaton, IL 60188).

<sup>2</sup> Matrix herbicide, formulated product with 25% rimsulfuron (Dupont Agricultural Products, Walker’s Mill, Barley Mill Plaza, Wilmington, DE 19980-0088).

<sup>3</sup> Frontier herbicide, formulated product containing a mixture of active and inactive isomers with 0.9 kg/L dimethenamid (BASF Corp., Agricultural Products Group, P.O. Box 13528, Research Triangle Park, NC 27709).

<sup>4</sup> Dual Magnum herbicide, formulated product with 0.92 kg ai/L S-metolachlor (Syngenta Crop Protection, Inc., P.O. Box 18300, Greensboro, NC 27409).

<sup>5</sup> Sencor herbicide, formulated product with 75% metribuzin (Bayer Corp., Crop Protection Products, P.O. Box 4913, Kansas City, MO 64120).

<sup>6</sup> Induce, non-ionic low foam wetter/spreader adjuvant with 90% principal functioning agents as a blend of alkyl aryl polyoxyalkane ether and free fatty acids (Helena Chemical Company, 5100 Poplar Avenue, Memphis, TN 38137).