

# Reflex for Pumpkins: Does it Have a Fit?

Final Report for 2016

Submitted to

Pennsylvania Vegetable Marketing and Research Program  
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## Overall summary:

- Varieties differed in their response to Reflex, and more injury was observed with Reflex at 20 fl oz compared to 10 fl oz
- Howden Biggie and Jill-Be Little had the most stunting over the course of the season
- Observed stunting did not impact yield, maturity, or fruit size
- Weed control was good to excellent with all treatments containing Reflex

## Personnel:

Dwight D. Lingenfelter, M.S., Extension Agronomist – Weed Scientist, Penn State University. Conducts educational programming about weed management in field crops in Pennsylvania and conducts research trials on various agronomic and horticultural crops at the Penn State Russell E. Larson Agricultural Research Facility near Rock Springs to provide practical information for field crop producers in Pennsylvania.

Mark J. VanGessel, Ph.D., Professor/Extension Weed Specialist, University of Delaware. Conducts research to develop cost-effective weed management programs in agronomic and vegetable crops, perennial weed control, and provides resources for county agents, agri-business and farmers for effective weed management.

## **Introduction:**

Pumpkins are produced on approximately 6,000 acres in Pennsylvania and 800 acres in Delaware (USDA Ag Census, 2012). Weed control in pumpkins is challenging for many reasons, including the production practices of wide rows, long growing season and limited number of herbicide options. No-till pumpkin production is even more challenging since cultivation is not possible. Reflex (fomesafen) has been evaluated in other regions as a candidate for pumpkin production, with fairly good success. It is being considered as a preemergence application including over the planted row. Reflex has a better spectrum of control than the current options, with the exception of common lambsquarters control. Preliminary work in Delaware showed some potential, but there appears to be differential response with various varieties. Since Syngenta is working with individual states for labeling Reflex on pumpkins, growers in PA and DE have inquired whether this will be an effective option for the region and if the respective universities have data to support a local needs label (24c).

We propose to evaluate Reflex for use in pumpkins. We will evaluate it for weed control as well as the response of various pumpkin varieties for differential tolerance to Reflex. In order to obtain a wider range of weeds, soil types, and growing conditions, the studies will be conducted at the Penn State research farm in Centre County and at the University of Delaware, Georgetown research farm. Benefits to state and regional pumpkin growers will include potential to petition for local needs label (24c) for Pennsylvania and well as more experience on how best to include Reflex in a weed management program. This information will also help to update information in vegetable production guides and other educational resources on how to effectively control weeds with existing and new products, and how best to integrate new herbicide modes of action into the production programs that include cover crops.

## **Objectives:**

1. To evaluate pumpkin safety of fomesafen (Reflex) with four common pumpkin varieties.
2. Determine the effect of Reflex when used in combination with a rye cover crop.

Field studies were conducted in 2016 in the Russell E. Larson Agricultural Research Farm in Centre County and at the University of Delaware Research and Extension Center in Sussex County in 2016. Studies were conducted as standard small-plot research techniques, arranged in a randomized complete block design with three replications for all trials.

Soil at PSU was a silt loam with over 2% organic matter and at UD the soil was a sandy loam with 0.7% organic matter. DE site was irrigated. Maintenance insecticide and fungicide treatments were on a standard schedule to control insects and pathogens.

**Trial 1:**

The study evaluated use of Reflex applied at planting at anticipated labeled rates for pumpkins (10 fl oz), twice the anticipated labeled rate (20 fl oz) for potential injury to pumpkins. Multiple pumpkin varieties were used with ‘Howden Biggie’, ‘Gladiator’ and ‘Solid Gold’ at both locations. In addition, UD planted ‘Field Trip’, Jill-Be Little’, and ‘Lumina’. The plots were a single row and 25 feet long. Plots were planted July 12 in DE and June 14 in PA. All combinations of pumpkin variety and Reflex rate of none, 10, or 20 fl oz/A were used. Pumpkins were seeded at twice the normal seeding rate to allow for more plants to evaluate for crop injury and then half the plants were removed at 28 days after planting and dry weights collected. Plots were kept weed-free with an application of Strategy at planting and hand weeding. Visual injury ratings were taken weekly. Yields were evaluated by number of fruit and size.

**Trial 2:**

This trial evaluated Reflex as part of a herbicide program for weed management for pumpkins grown with a rye cover crop. This study was only done in DE. Cereal rye was seeded in the fall, sprayed with glyphosate 10 days before planting and ‘Magician’ were hand-seeded on June 27. Plots were 10 feet wide (single row of pumpkins) and 25 feet long. Herbicide treatments were applied within 24 hrs of planting and are listed in Table 2. Visual crop injury and weed control were collected and final yields recorded.

Table 1. Effect of Reflex rate and pumpkin variety on injury and yield. Values followed by the same letter for variety or herbicide are not significantly different from one another.

Main Effect	DE Site						PSU Site							
	Stunting 2 WAP			Biomass Reduction at Harvest			Number of Fruit			Stunting 2 WAP			Number of Fruit	
<b>Pumpkin Variety</b>														
Howden Biggie	26	ab		31	a		4	c		6	a		15	a
Gladiator	31	a		14	bc		6	bc		3	a		17	a
Solid Gold	12	bc		8	c		8	b		3	a		13	a
Lumina	10	c		15	bc		4	c						
Field Trip	24	abc		8	c		11	a						
Jill-Be Little	39	a		25	ab		.							
<b>Herbicide</b>														
Reflex 10 fl oz	11	b		11	b		7	a		1	b		16	a
Reflex 20 fl oz	36	a		23	a		6	a		9	a		15	a
None							6	a					14	a

Observations:

- More pumpkin injury was observed at DE than PA, presumably due to the coarse-textured soils.
- There was no variety by herbicide interaction for stunting, so all varieties responded similarly to Reflex
- At DE, Solid Gold, Lumina, and Field Trip had the least amount of injury
- Howden Biggie, Gladiator, and Jill-Be Little had the most amount of injury at 2 weeks after planting, but Gladiator recovered quicker than the other two varieties.
- At both sites there was a rate response for injury, with more injury observed from the 20 fl oz rate (high rate)
- Smaller plants were observed for up to 8 weeks after planting in DE, although no differences in plant biomass was detected (data not presented)
- Yield differences were recorded for different varieties, as expected. But use of Reflex did not impact fruit number, fruit weight, fruit size, nor fruit maturity at either site (data not presented)

Table 2. Herbicide programs for weed control in pumpkins. Pumpkin stunting taken 2 weeks after planting (WAP) and weed control taken prior to 5 WAP.

Herbicide(s) treatment*	Rate/A	Applic timing**	Stunting 2 WAP		Palmer Amaranth		Crabgrass	
Untreated								
Command + Curbit	1 pt + 1.5 pt	PRE	3	de	83	b	72	b
Command + Curbit + Reflex	1 pt + 1.5 pt + 10 fl oz	PRE	13	b	97	a	89	a
Curbit + Reflex	1.5 pt + 10 fl oz	PRE	6	cde	98	a	91	a
Command + Reflex	1 pt + 10 fl oz	PRE	7	bcd	100	a	90	a
Command + Curbit + Reflex	1 pt + 2.0 pt + 10 fl oz	PRE	7	bcd	100	a	89	a
Reflex fb Select + NIS	10 fl oz fb 8 fl oz + NIS	PRE POST	11	bc	100	a	89	a
Command + Curbit + Reflex + Sandea	1 pt + 1.5 pt + 10 fl oz + 0.5 oz wt	PRE	19	a	98	a	92	a

\*NIS=nonionic surfactant

\*\*abbreviations reference: PRE – preemergence; POST – postemergence

Table 3. Herbicide programs for pumpkin yields. Rates are based on coarse-texted soils.

Herbicide(s) treatment*	Rate/A	Applic timing**	Number fruit/plot		% small size fruit***	
Untreated			10	a	84	a
Command + Curbit	1 pt + 1.5 pt	PRE	10	a	70	a
Command + Curbit + Reflex	1 pt + 1.5 pt + 10 fl oz	PRE	9	a	65	a
Curbit + Reflex	1.5 pt + 10 fl oz	PRE	10	a	60	a
Command + Reflex	1 pt + 10 fl oz	PRE	11	a	72	a
Command + Curbit + Reflex	1 pt + 2.0 pt + 10 fl oz	PRE	12	a	53	a
Reflex fb Select + NIS	10 fl oz fb 8 fl oz + NIS	PRE POST	9	a	58	a
Command + Curbit + Reflex + Sandea	1 pt + 1.5 pt + 10 fl oz + 0.5 oz wt	PRE	9	a	66	a

\*NIS=nonionic surfactant

\*\*abbreviations reference: PRE – preemergence; POST – postemergence

\*\*\*Fruit was classified as small, medium, large, and extra-large. Small sized is combination of small and medium fruit.

#### Observations:

- Early-season stunting was low for most treatments, including Reflex (<13%). Sandea applied PRE had the most injury, 19% stunting (Table 2)
- Early-season weed control was excellent for all treatments >97% control of Palmer amaranth and >88% control of large crabgrass (data not presented)
- Weed control at 5 WAP was excellent for all treatments containing Reflex, providing >97% control of Palmer amaranth and >89% large crabgrass control. Command and Curbit had the lowest level of weed control (Table 2)
- Treatments did not influence number of fruit or size of fruit (Table 3)
- Treatments also did not affect maturity of fruit (data not presented)

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