

**HERBICIDE TOLERANCE IN  
HIGHBUSH BLUEBERRY**

**RESEARCH RESULTS – 2006**

**PREPARED BY DARREN ROBINSON,  
RIDGETOWN CAMPUS**

**FOR THE ONTARIO BLUEBERRY  
GROWERS ASSOCIATION**

**OCTOBER 11, 2006**

## **ACKNOWLEDGEMENTS**

### **Purpose Of This Booklet**

This booklet is provided as a guide to the 2006 highbush blueberry herbicide tolerance research trials. The experiments outlined in this booklet are located at Park's Blueberries, so we would also like to thank Bill and Bruce Parks for their significant contribution to this research. We appreciate the funding, cooperation and assistance provided by the Ontario Blueberry Growers Association. As well, we would like to thank the chemical companies and their representatives, agextension personnel, and other research scientists for their ideas, plant material and herbicide samples that were used in these trials. Funding for the 2006 research program was provided by:

Ontario Blueberry Growers Association  
Summer Job Service 2005

Agriculture & Agri-Food Canada

### **Technical Assistants**

Research Technician  
Kristen McNaughton

Research Assistants  
Jamie Lynn Lather  
Darcy Vink  
Sean Vink

We trust that the information provided by this research will further the science of weed control by assisting with the registration of herbicides through the minor use system. We also hope this information will be of use in the extension of proper herbicide recommendations, thereby enabling growers to achieve consistent, broad spectrum weed control with a minimum of crop damage.

D.E. Robinson  
Ridgetown Campus, University of Guelph  
Ridgetown, Ontario  
NOP 2C0  
(519) 674-1604  
[drobinso@ridgetownc.uogelph.ca](mailto:drobinso@ridgetownc.uogelph.ca)

## **Study title: Tolerance of Blueberry to Preemergence and Postemergence Broadleaf Herbicides**

### **Objectives:**

1. Determine the tolerance of blueberry to preemergence applications of Valor (flumioxazin), Authority, and Callisto.
2. Determine the tolerance of blueberry to postemergence applications of Refine Extra and Pardner.

### **Materials & Methods:**

**Crop:** blueberry

Variety: Bluecrop

Planting rate: 2150 plants/ha

Row spacing: 3m

Planting date: Apr 20/81

Depth: 20 cm

**Design:** Randomized Complete Block Design

Plot width: 2m

Plot length: 10m

Reps: 4

#### **Soil Description:**

Sand: 75%

Silt: 15%

Clay: 10%

OM: 4.9%

pH: 6.4

CEC 15

Texture: Sandy Loam

Soil: Barrien

#### **Spray Equipment:**

Application Method: CO2 Backpack

Nozzle Type: Flat Fan

Nozzle Spacing: 50 cm

Spray Volume: 200 L/ha

Pressure: 207 KPA

Nozzle Size: 8002XR

Boom Width: 2 m

***Application Information:***

	<b>A – PREEMERGENCE</b>	<b>B – POSTEMERGENCE</b>
APPLICATION DATE	APRIL 21/06	MAY 5/06
TIME OF DAY	7:15 AM	7:30AM
TIMING	PREEMERGENCE	WEEDS 3-5 LEAF
AIR TEMP (c)	14C	12C
RH (%)	64%	38%
WIND SPEED (KPH)	2 KPH	2 KPH
SOIL TEMP (c)	12C	12.5C
CLOUD COVER (%)	100%	5%
CROP STAGE	BUD SWELL	EARLY PINK BUD

<b><i>Treatments:</i></b>	<b>Formulation</b>	<b>Product Rate (L or g/ac)</b>	<b>Timing</b>
1. Check (WEED-FREE)			
2. VALOR	51 WG	55g/ac	A
3. VALOR	51 WG	110g/ac	A
4. AUTHORITY	75 DF	67g/ac	A
5. AUTHORITY	75 DF	135g/ac	A
6. CALLISTO	480 EC	120 ml/ac	A
7. CALLISTO	480 EC	240 ml/ac	A
8. REFINE EXTRA	75 DF	8 g/ac	B
+ AGRAL 90		0.2% V/V	B
9. REFINE EXTRA	75 DF	16 g/ac	B
+ AGRAL 90		0.4% V/V	B
10. PARDNER	280 EC	480 ml/ac	B
11. PARDNER	280 EC	960 ml/ac	B

## Results:

None of the preemergence herbicides caused visual injury to blueberries – all applications were made just prior to bud break on April 21<sup>st</sup>, 2006. Despite the lack of injury, the overlap rate of Valor (flumioxazin) caused a significant reduction in yield during the first pick. The second pick was not reduced by this treatment. This corresponded to observations made during the preliminary trials in 2005, which indicated that Valor can delay maturity (delayed bud break and foliar development). The remaining preemergence herbicides (Authority and Callisto) did not reduce yield or delay blueberry maturity. **An URMULE submission has been made to register Callisto on highbush blueberry. These data will be used to support that submission.**

Refine Extra did not injure blueberry when applied to the base of the plant at the early pink bud stage (application made on May 5<sup>th</sup>, 2006). Refine Extra did not delay maturity or reduce yield when applied this early in the growing season.

Pardner did not injure blueberry when applied to the base of the plant at the early pink bud stage (application made on May 5<sup>th</sup>, 2006). Pardner did not delay maturity or reduce yield when applied this early in the growing season.

## Conclusions:

Authority and Callisto have demonstrated excellent tolerance in blueberry in two years of field work. Callisto is a useful broadleaf herbicide that has some activity on crabgrass. Additional studies should be conducted to determine if other blueberry varieties are equally as tolerant as Blue Crop, and whether Callisto can be used at later timings. **We should continue to work toward registration of Callisto as a preemergence herbicide in blueberries. Authority may have potential for use in blueberry, but it is not currently registered in Canada.**

Though we did not observe visual injury in the Refine Extra or Pardner applications, additional work should be done to determine the tolerance of blueberry to later postemergence timing of Pardner. In 2005, Refine Extra caused significant visual injury and delayed maturity when it was sprayed over top of plants early in their development (ie. At bud swell), and in the late timing trial conducted on June 5<sup>th</sup>, 2006, it caused severe mortality of young shoots growing from the base of the plants.

**Table 1. Blueberry yield at first and second picks, as well as total yield.**

<b>Treatment #</b>	<b>Herbicide rate (L or g/ac)</b>	<b>First pick</b>	<b>Second pick</b>	<b>Total yield</b>
1. Check (WEED-FREE)		1.5	1.8	3.3
2. VALOR	55g/ac	1.9	2.4	4.3
3. VALOR	110g/ac	<b>1.3*</b>	1.8	3.1
4. AUTHORITY	67g/ac	2.0	2.0	4.0
5. AUTHORITY	135g/ac	1.8	2.3	4.1
6. CALLISTO	120 ml/ac	1.7	2.2	3.9
7. CALLISTO	240 ml/ac	1.7	2.6	4.3
8. REFINE EXTRA	8 g/ac	1.7	2.1	3.8
+ AGRAL 90	0.2% V/V			
9. REFINE EXTRA	16 g/ac	1.6	2.2	3.8
+ AGRAL 90	0.4% V/V			
10. PARDNER	480 ml/ac	2.0	2.0	4.0
11. PARDNER	960 ml/ac	1.5	2.2	3.7
LSD (P <0.05)		0.6	1.0	1.4

Note: Means followed by an asterisk are significantly less than the untreated check (P=0.05, LSD).

## **Study title: Tolerance of Blueberry to Late Postemergence Applications of Callisto, Refine Extra and Two Grass Herbicides**

### **Objectives:**

1. Determine the tolerance of blueberry to late postemergence applications of Callisto and Refine Extra.
2. Determine the tolerance of blueberry to postemergence applications of Assure II and Excel Super.

### **Materials & Methods:**

***Crop:*** blueberry

Variety: Bluecrop

Planting rate: 2150 plants/ha

Row spacing: 3m

Planting date: Apr 20/81

Depth: 20 cm

***Design:*** Randomized Complete Block Design

Plot width: 2m

Plot length: 10m

Reps: 4

### ***Soil Description:***

Sand: 75%

Silt: 15%

Clay: 10%

OM: 4.9%

pH: 6.4

CEC 15

Texture: Sandy Loam

Soil: Barrien

### ***Spray Equipment:***

Application Method: CO2 Backpack

Nozzle Type: Flat Fan

Nozzle Spacing: 50 cm

Spray Volume: 200 L/ha

Pressure: 207 KPA

Nozzle Size: 8002XR

Boom Width: 2 m

***Application Information:***

**A – POSTEMERGENCE**

APPLICATION DATE	JUNE 5/06
TIME OF DAY	9:00 AM
TIMING	WEEDS 5 LEAF+
AIR TEMP (c)	23C
RH (%)	32%
WIND SPEED (KPH)	4 KPH
SOIL TEMP (c)	17C
CLOUD COVER (%)	100%
CROP STAGE	BLOOM

<b><i>Treatments:</i></b>	<b>Formulation</b>	<b>Product Rate (L or g/ac)</b>	<b>Timing</b>
1. Check (WEED-FREE)			
2. ASSURE II + SURE MIX	96 EC	300 ml/ac 1.0% V/V	BLOOM
3. EXCEL SUPER	81 EC	270 ml/ac	BLOOM
4. REFINE EXTRA + AGRAL 90	75 DF	8 g/ac 0.2% V/V	BLOOM BLOOM
5. CALLISTO	480 EC	240 ml/ac	BLOOM

## Results:

Assure II and Excel Super did not cause visual injury to blueberry when applied at full bloom (June 5<sup>th</sup>, 2006).

Refine Extra applied postemergence at bloom caused significant visual injury and killed new shoot growth at the base of the plant.

Callisto applied postemergence on June 5<sup>th</sup>, 2006, did cause some bleaching of new tissues at 7 days after treatment (DAT). However, by 14 DAT the plants had outgrown the visual injury

## Conclusions:

Callisto shows excellent tolerance when applied as a preemergence herbicide (prior to bud break) in blueberry in two years of field work. Callisto is a useful broadleaf herbicide that has some activity on crabgrass, and can also control weeds postemergence. **Due to the temporary visual injury observed in this study, additional research should be conducted to determine if other blueberry varieties are equally as tolerant as Blue Crop, and whether Callisto can be used at later timings.**

In 2005, Refine Extra caused significant visual injury and delayed maturity when it was sprayed over top of plants early in their development (ie. At bud swell), and also in this study at the late timing application on June 5<sup>th</sup>, 2006. Since Refine Extra is not a preemergence herbicide and caused severe mortality of young shoots growing from the base of the plants when applied as a true postemergence spray (i.e. after weed emergence and after bud break), its use in blueberry is limited.

Assure II is a cheap alternative to Venture L for quackgrass control, and Excel Super has good to excellent activity on crabgrass. **We should begin work to register Assure II if growers feel quackgrass is a significant issue in blueberries.**

**Table 2. Blueberry visual injury – late postemergence timing trial.**

<b>Treatment #</b>	<b>Herbicide rate (L or g/ac)</b>	<b>7 DAT</b>	<b>14 DAT</b>	<b>28 DAT</b>
1. Check (WEED-FREE)				
2. ASSURE II	300 ml/ac	0	0	5
3. EXCEL SUPER	270 ml/ac	0	0	0
4. REFINE EXTRA	8 g/ac	<b>5*</b>	<b>10*</b>	<b>15*</b>
+ AGRAL 90	0.2% V/V			
5. CALLISTO	120 ml/ac	<b>8*</b>	0	0
LSD (P <0.05)		3	5	8

Note: Means followed by an asterisk are significantly more than the untreated check (P=0.05, LSD).