SUMMARY RESEARCH PROGRESS REPORT FOR 2002
AND RESERCH PROPOSAL FOR 2003

Submitted to:

SLV Research Center Committee
and the Colorado Potato Administrative Committee (Area II)

TITLE: Vertical Distribution of Eptam, Dual Magnum, Outlook, Sencor and Matrix in Soil Based on the Amount of Water Used for Incorporation.

PROJECT LEADERS: Dr. Scott Nissen, Department of Bioagricultural Sciences and Pest Management, Colorado State University, Fort Collins.

IMPACT STATEMENT: The San Luis Valley is truly a unique and wonderful environment; however, intense production agriculture has the potential to significantly impact water quality in the Rio Grande Watershed and the San Luis Closed Basin. Three of the eight most common pesticides found in the San Luis Valley ground water are herbicides used in potato production. These include Dual, Sencor and Eptam. Levels of these contaminates are not high, but their presence illustrates that the shallow ground water of the San Luis Valley is vulnerable to contamination. This research project will help to define best management practices to reduce the potential environmental impacts of herbicides used in potato production. The safe and environmentally responsible use of pesticide (in this case herbicides) requires that producers understand how to reduce movement below the potato root zone. The commitment of San Luis Valley potato industry to support this research demonstrates a strong commitment to environmental stewardship.

PROJECT JUSTIFICATION: We have demonstrated that soil moisture levels at the time of chemigation can significantly influence the vertical distribution of herbicides in the soil profile under laboratory conditions. In soils columns with several inches of dry soil at the surface, movement out to weed seed germination zone (upper inch) was minimal for all herbicides evaluated. Simulated chemigation to soils that are at or near field capacity to the soil surface showed much greater vertical herbicide movement. The amount of herbicide moving out of the surface 1 inch of soil is related to several herbicide characteristics shown in Table 1. Our laboratory study simulating chemigation applications of Dual Magnum, Sencor, Eptam, Outlook and Matrix clearly illustrated that herbicides with high water solubility and lower Kow values moved to greater depth in soil profile if the soil surface soil was wet at application.

The relative amount of all herbicides in the surface 1-inch of soil decreased significantly if the soil was at or near field capacity at application; however, the greatest decrease was with Matrix. The relative concentration of Matrix decreased from 85% to 50% in moist soil. The study conducted in 2001 was interesting, but might not truly represent what would happen under field conditions. In 2002, a field study was initiated at the San Luis Valley Research Center to determine if results from our laboratory column study would be reproduced under field conditions.

Table 1. Water solubility and K_{ow} values for common potato herbicides.

Herbicide	Water Solubility (ppm)	K_{ow}
Eptam	370	130,000
Prowl	0.3	152,000
Dual Magnum	488	794
Sencor (metribuzin)	1100	45
**Outlook	1174	141
Matrix	7,300	0.034

****Outlook** from BASF that is being registered for use in potatoes and should be available for the 2004 field season.

PROJECT STATUS: Continuing

SIGNIFICANT ACCOMPLISHMENTS FOR 2002:

The experimental was conducted at the San Luis Valley Research Center in Center, CO. An experimental area, 40 ft wide by 130 ft long, was left fallow and maintained weed free by cultivation. Experimental plots were 10 ft wide and 30 ft long and each treatment was replicated 4 times. Herbicides were applied with a small plot, CO_2 backpack sprayer at an application volume of 20 gal/ac. The herbicides were applied at different rates depending on the relative sensitivity for GC/MS analysis; however, all herbicides were applied at the same time.

Experimental Procedures were as follows:

-The soil had been watered several days before application to make sure that the lower part of the soil profile was moist, but the soil surface was dry.
-The herbicide mixture was applied to half the plots and sprinkler irrigation was used to apply 0.5 inches of water immediately after application.
-After application treated plots were sampled to a depth of 6 inches and samples were divided into increments of 0-1, 1-2, 2-3, and 3-6 inches. Each plot was sub-sampled four times, sub-samples were mixed in stainless steel buckets and transferred to glass vials with Teflon liners.
-The same herbicide mixture was then applied to the other plots that were now wet to the soil surface and an additional 0.5 inches of water applied for incorporation.
-All plots were sampled as previously described so there were three treatments 1) application to dry soil with 0.5 inches of water for incorporation 2) application to dry soil with 1 inch of incorporation and 3) application to wet soil with 0.5 inches of incorporation. Samples were kept cold with dry ice, transport to CSU and stored at –20C until they could be analyzed by GC-MS.

Results:

This experiment required a great deal of analytical time and effort to evaluate vertical movement of five herbicides. This is the first time that we have conducted an experiment that would allow side by side comparisons of five major potato herbicides. It would be rare that a commercial potato field would be dry to a depth of 6 inches; therefore, the experimental area was pre-irrigated before the experiment was conducted.

This experiment also provided some insights into the influence of the amount of water for incorporation. Growers are often interested in information about water volume and how it might affect herbicide performance. The results will be discussed by herbicide.

Eptam: The vertical distribution of Eptam varied significant across the three treatments (**Figure 1**). The most striking difference between treatments is the Eptam concentration found in the one inch of soil. Incorporating Eptam with 1 inch of water reduced the surface concentration by 50% compared to 0.5 inches. Previous work has suggested that Eptam chemigation to wet soil could cause significant losses and in this experiment the surface concentration of Eptam was reduced by 87% when the application was made to wet soil and incorporated with 0.5 inches of water.

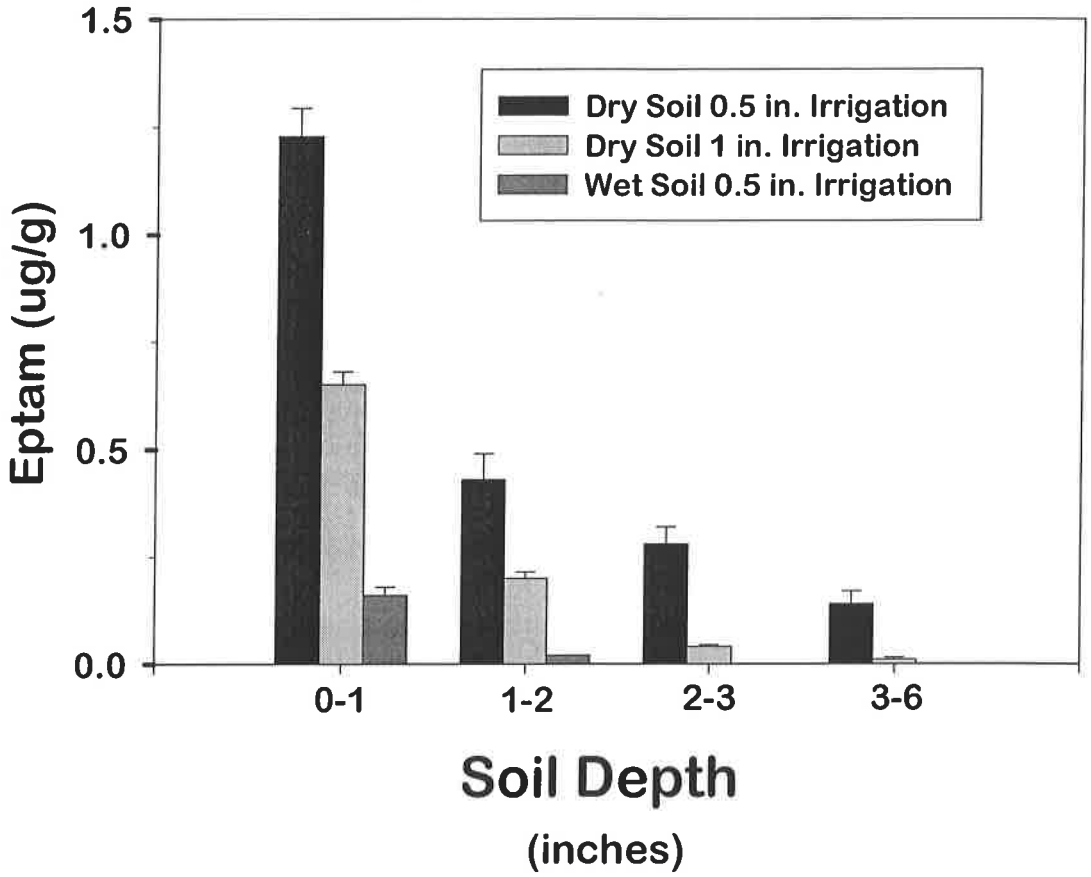

Figure 1. Vertical distribution of Eptam following three incorporation programs. Experiment was conducted the San Luis Valley Research Farm, Center CO.

Sencor: Sencor is probably the most commonly used herbicide for potato weed control in the US. Unfortunately, Sencor is also commonly found in ground water samples. Sencor's water solubility and Kow values (Table 1) illustrate that Sencor has moderate to high water solubility and a relatively low Kow value. Matrix is the only compound in this study with greater water solubility and lower Kow values. The vertical movement of

Sencor in this study demonstrates what could happen when too much water is applied for incorporation. As with Eptam, the highest concentration of Sencor in the surface inch of soil occurs with what we might consider the best management practice (**Figure 2**), chemigating to dry soil and incorporating with a modest amount of water. Incorporating with 1 inch of water or applying Sencor to wet soil resulted in a 50% reduction in herbicide concentration at the soil surface where the majority of weeds germinate.

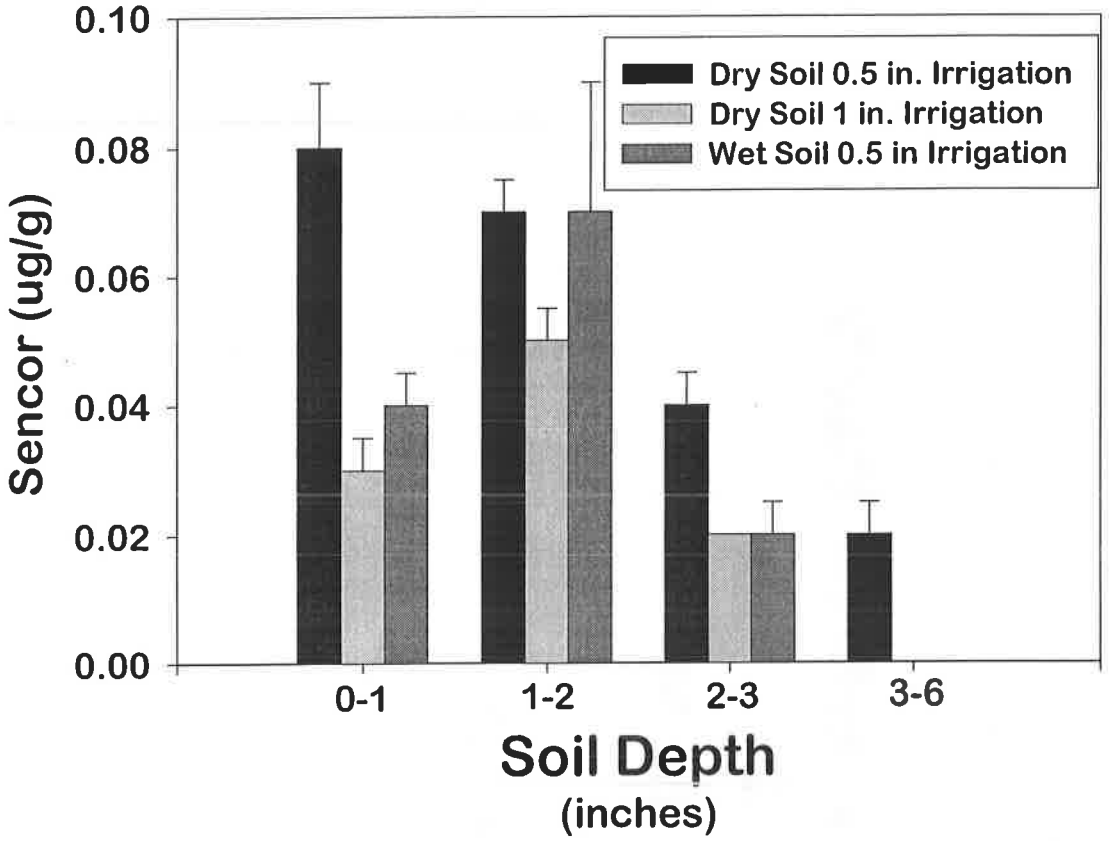

Figure 2. Vertical distribution of Sencor following three incorporation programs. This experiment was conducted at the San Luis Valley Research Center, Center, CO.

Outlook: Outlooks has been evaluated for weed control in the San Luis Valley for several years. It is similar in many ways to Dual Magnum and controls many of the same weed species. A new registration packet for Outlook, that includes potatoes, is scheduled for EPA review in the 3rd quarter of 2003 for possible labeling in 2004. That makes the current research very timely; however, we would expect Outlook to behavior very similarly to Dual Magnum. Outlook's vertical distribution is the soil profile was influenced more by the total amount of water applied and less by applications to wet soil (**Figure 3**). As with the other herbicides, the highest concentration of Outlook occurred with applications to dry soil and incorporation with 0.5 inches of water. Outlook's water solubility and Kow value is between Sencor and Dual Magnum. Under dryland cropping systems this higher water solubility could be important because theoretically Outlook would need less water to become biologically active. Under irrigated cropping systems,

Outlook chemigation and incorporation could influence herbicide performance if application volumes are excessive. Incorporating Outlook with 1 inch of water resulted in a 56% decrease in herbicide concentrations compared to 0.5 inch.

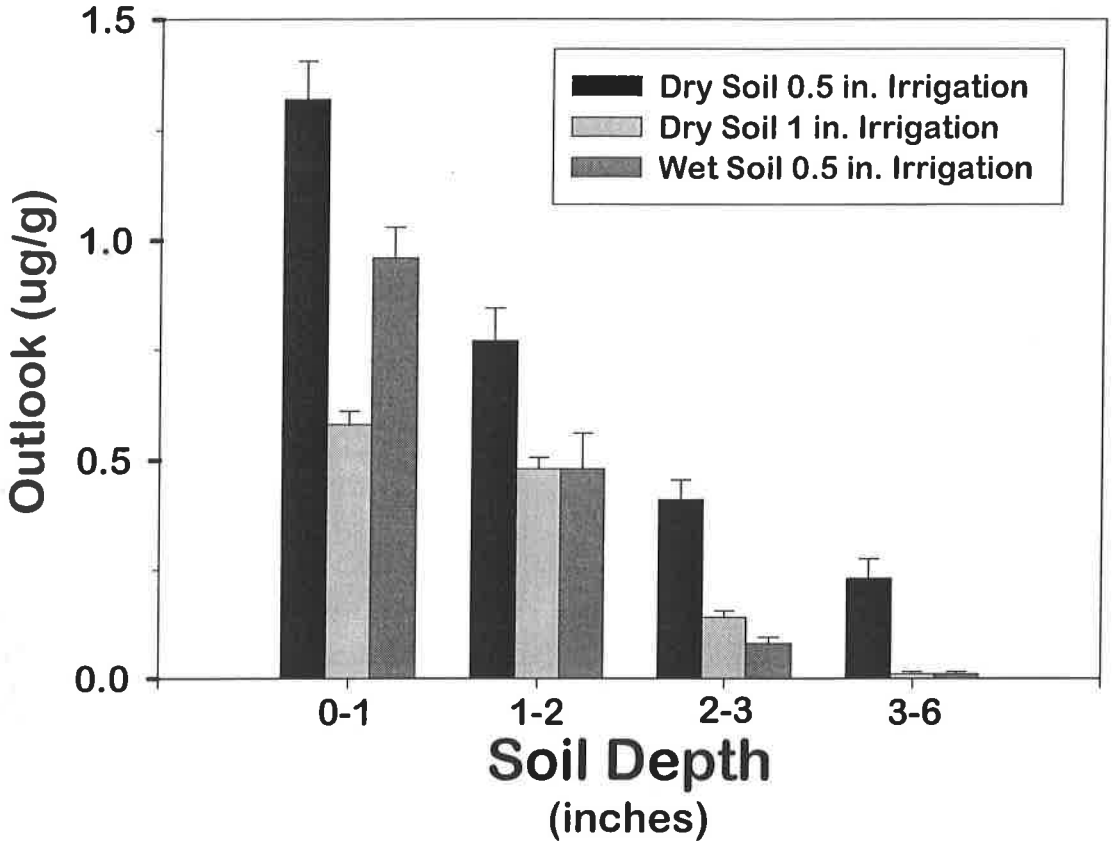

Figure 3. Vertical distribution of Outlook following three methods of incorporation. This experiment was conducted at the San Luis Valley Research Center, Center, CO.

Dual Magnum: Dual Magnum is a newer formulation of Dual with a higher concentration of the active isomer, s-metolachlor. Dual Magnum was applied at a higher rate than Outlook and that is why the soil concentrations of Dual Magnum are higher than Outlook. Based primarily on adsorption characteristics, Dual Magnum is less active than Outlook because more Dual Magnum is adsorbed to soil organic matter. The effects of soil adsorption on retention of Dual Magnum were illustrated in this research project (**Figure 4**). Differences in the Dual Magnum concentration in the surface inch of soil were less variable then with the other herbicides. Applications to wet soil and 1 inch of water for incorporation reduced Dual Magnum concentrations 23 and 37%, respectively. This is significantly less than with Outlook, Sencor, and Eptam; however, Eptam losses were more likely due to volatility than to vertical movement in the soil profile. The new formulation Dual Magnum has been very affect for weed control in potatoes. Even though Dual has been detected in ground water samples it is probably

the result of rates that slightly higher than necessary and the large number of acres treated.

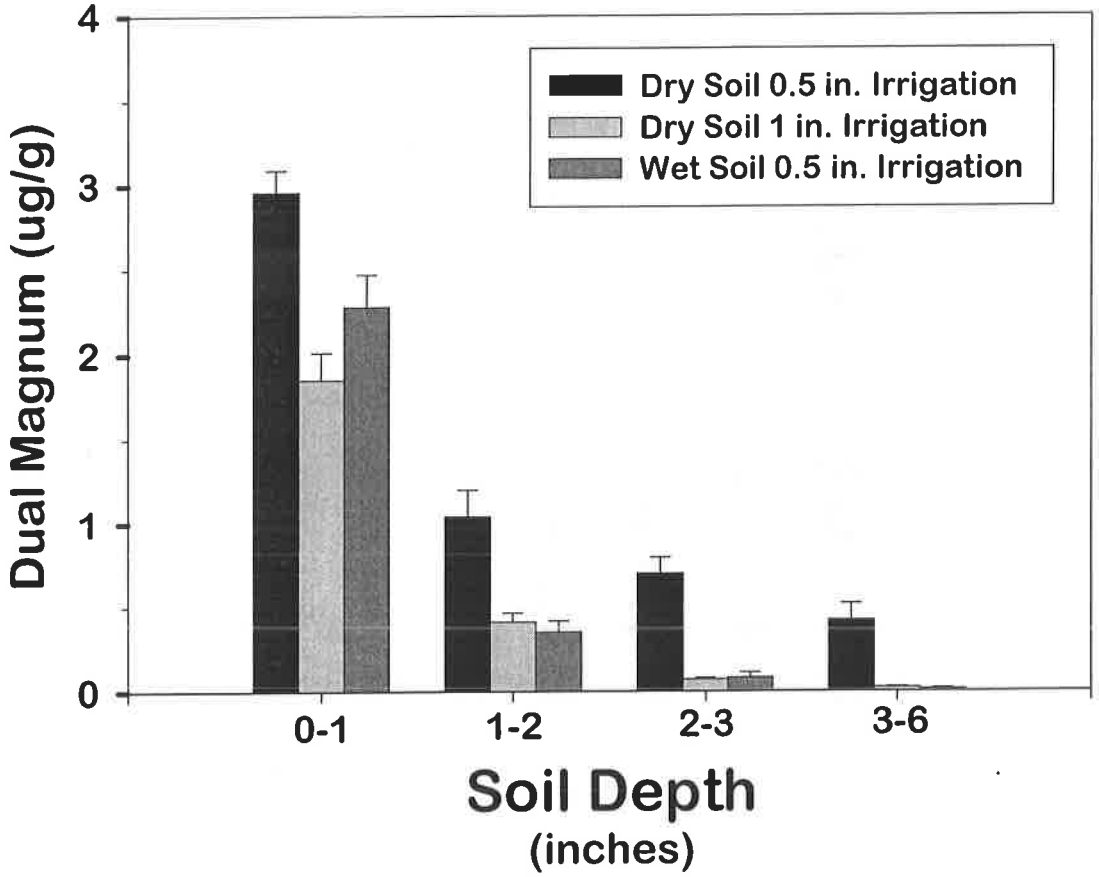

Figure 4: Vertical distribution of Dual Magnum due to three methods of incorporation. This experiment was conducted at the San Luis Valley Research Center, Center, CO.

Matrix: Matrix is the newest herbicide for potato weed control. It has been widely used across the US for control of nightshades and grasses. Matrix has considerable grass activity and could provide another means of controlling volunteer barley. In Idaho, Matrix has injured sugar beets 12 months after applications to potatoes and at times the weed control has been below expectations. Du Pont has changed the direction for use slightly since Matrix was first introduced. The original recommendation was for PRE applications in combination with most other potato herbicides. Combinations with Dual, Sencor and Eptam were popular for broad spectrum weed control. Recent recommendations suggest early POST applications.

Matrix was susceptible to significant movement out of the surface soil layer with higher incorporation volumes and with applications to wet soil (**Figure 5**). In fact, the Matrix concentration in the surface soil layer was reduced by 70% with the 1inch of water used for incorporation treatment. There were relative higher amounts of Matrix in the 3-6 soil layer than for any other herbicide. Even the applications to dry soil with 0.5 inches of

water for incorporation resulted in relatively high Matrix concentrations at the 3-6 inch depth. This was somewhat unexpected based on laboratory studies conducted in 2001.

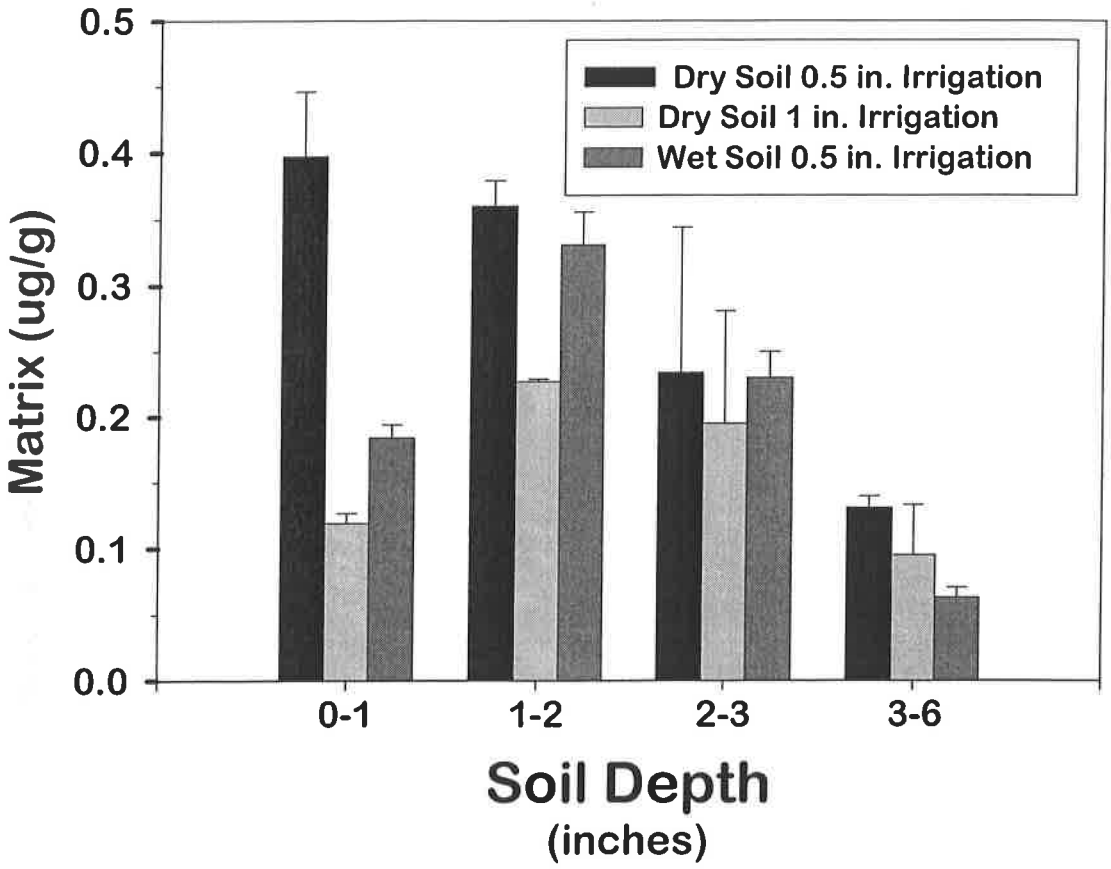

Figure 5. Vertical distribution of Matrix due to three incorporation treatments. This experiment was conducted at the San Luis Valley Research Center, Center, CO.

OBJECTIVES FOR 2003:

This project has provided some very interesting information comparing the vertical distribution of herbicide based on simulations of what could happen under field conditions.

- The most important thing is to repeat this research to determine if the trends observed in 2002 are consistent enough to help in the determining best management practices for herbicide applications and incorporation under conditions in the SLV. These herbicides vary significantly in water solubility and K_{ow}; therefore, a one-size fits all approach may not be appropriate.

- In addition to repeating the experiment, Spartan will also be evaluated under the same conditions to determine the potential for vertical movement in the soil

profile. By repeating the previous research with the addition of Spartan, a data base will be developed that should allow for better recommendations for Spartan use in SLV.

- Application volume and its effect on weed control is an issue that is very difficult to evaluate under field conditions. Using field soils collected from the SLV and conducting studies in the greenhouse it should be possible to make this determination. We now have a new spray chamber with rainfall simulation capability, which would be suitable for conducting these types of experiments. We anticipate that as greater application volumes dilute the herbicide concentration weed control will be reduced. This reduction in weed control could vary substantially between herbicides.

FUNDING REQUEST:

2002 Allocation: $9,000

2003 Request: $14,000

Item	Cost
Support staff-Research Associate -establishment of field experiment -soil sampling -collection of soil for greenhouse experiments -conducting greenhouse studies	$3,000
Support staff-Lab manage -extracting soil sample -GC-MS and HPLC analysis of six different herbicides -data analysis	8,000
Travel	1,000
Supplies for GC-MS	1,500
Miscellaneous Supplies	500
Total	**$14,000**

2002 –Use of Funds Report

Report on funds used rounded to the nearest dollar.

1. **Project labor**

   Laboratory Manager
   - -Methods development and preliminary experiments
     Dual, Sencor, Eptam and Outlook can be analyzed GC/MS, Matrix is analyzed by HPLC.
   - -Actual simple analysis, quality control samples, data analysis, report generation, equipment maintenance, training hourly workers, clean up.

   Laboratory manager: 2.5 months @ $4,200=$10,500
   Student hourly: 0.5 months @1,200=$600

   Total Labor $11,100

2. **Project Travel: $168 vehicle**
   $150 lodging and meals (2 people, 1 night)
   Total $318

3. **Project Chemicals:** analytical standard from Sigma $500
   Total Chemical Costs: $500

4. **Project Ag Supplies: $0.0**

5. **Project Equipment:**
   Overhaul of GC/MS $3,500/6 =$583 share of GC/MS maintenance charges associated with project.

   Total equipment $583

6. **Project Misc.**

Sample vials	$100
Pipette tips	$200
Organic solvents	$150
Total Misc.	**$450**

Total Expenses	**$12,451**
SLVRCC	**$9,000**
Balance	**-$3,451**

SUMMARY RESEARCH PROGRESS REPORT FOR 2002
AND RESERCH PROPOSAL FOR 2003

Submitted to:

SLV Research Center Committee
and the Colorado Potato Administrative Committee (Area II)

TITLE: Cost Effective Weed Management with Spartan, Valor and Prowl.

PROJECT LEADERS: Dr. Scott Nissen, Department of Bioagricultural Sciences and Pest Management, Colorado State University, Fort Collins.

IMPACT STATEMENT: Production costs continue to increase without subsequent increases in market prices for potatoes. New herbicides evaluations are designed to identify new, more effective and less expensive products for weed management in potato production and develop data necessary to commercialize these products through IR-4. Technology developed through this program could reduce weed management costs by $14/ac, saving the SLV potato industry approximately $1.2 million annually.

PROJECT JUSTIFICATION: Matrix was the first new herbicide labeled for use in potatoes in more than twenty years. The wide spread occurrence of ALS resistant kochia and carryover problems to sugar beets have producers and weed scientists concerned. Evaluating new products for weed control in potatoes has been a major focus of my research effort for the past 4 years. This work will provide growers with two new products for broadleaf weed control; Spartan and Valor.

Based on research supported by CPAC these new herbicides are close to being granted full section three labels. Spartan was discovered and is marketed by FMC and provides excellent broadleaf weed control including all nightshade species, redstem filaree, pigweed, lambsquarters and common mallow. Field tests indicate that applications of Spartan at rates as low as 2.5 oz product/ac in combination with some grass herbicide can provide long weed control with no measurable crop response. Spartan received a Section 18 label in 2002; however, due to late approval by EPA only 70 acres were treated in the SLV. Spartan provided excellent weed control in this field situation. We have applied for and hope to receive a Section 18 for Spartan for the 2003 field season.

Valor is marketed by Valent and is currently being used in the fruit tree and vine crop market. Valor also has an excellent spectrum for broadleaf weed control in potatoes because of its activity on all nightshade species. Valor is non-mobile in the soil and so would fit well in areas where herbicide movement to ground-water is an issue. Both Spartan and Valor are applied as PRE/drag-off type treatments and so will be compatible with current weed management practices. In this research project we are evaluating combinations of Spartan and Valor with Prowl. If these herbicide combinations provide adequate weed control the cost savings to growers would be significant.

PROJECT STATUS: Continuing

SIGNIFICANT ACCOMPLISHMENTS FOR 2002:

The objective of this field experiment was to evaluate Spartan + Prowl and Valor + Prowl treatments to a standard Dual + Matrix treatment. Spartan, Valor and Prowl were applied at two different rates each for total of eight treatments. In addition, Valor was applied alone at four rates to evaluate crop safety.

All treatments provided good to excellent weed control through July 22nd with minimal crop response; however, Spartan and Valor treatments provided significantly better hairy nightshade control then Dual + Matrix at the August rating date. While yields were not statistically different for herbicide treated plots most herbicide treated plots out yielded the untreated check by as much as 100 cwt/ac.

The low rate treatments of Spartan + Prowl and Valor + Prowl provided weed control and potato yields comparable to Dual + Matrix treatment at a cost saving of at least $15 per acre.

OBJECTIVES FOR 2003:

Due to limited water availability at the SLV Research Center, I would limit the 2003 field experiment to just 12 treatments rather than the 16 that I used in 2002. I would like to continue this experiment for a second season to provide a better evaluation of Spartan and Valor as replacements for Matrix and Sencor.

A Section 18 request for Spartan use in potatoes has been submitted by the CDA with supporting data from CSU for 2003 field season. If the EPA grants the Section 18, I hope to make several field scale chemigation treatments using off station cooperators. This would be the first large chemigation applications made for Spartan. If this product is going to have an impact on potato weed management in San Luis Valley, we need to know how it works when applied by chemigaiton. I have as small chemigation system that would allow for small pie shaped plots between 3 and 7 acres. This part of project does not depend on CPAC funding.

FUNDING REQUEST:

2002: Allocation: $4,000

2003: Request: $4,000

Item	Cost
Field Support Salaries-technical, student hourly -establishing plots -herbicide applications -handweeding of untreated plots -harvest, grading, data analysis	$3,500
Miscellaneous Supplies	500
Total	**$4,000**

Potato Weed Control With Spartan, Valor and Prowl

Colorado State University

Trial ID: POTO022 Cooperator: CPAC

Location: Center, CO Investigator: Dr. Scott Nissen, Jim Sebastian

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	Appl Code	POTATO Injury % 6-28-02	Hairy N-shade Control % 6-28-02	Lambs quaters Control % 6-28-02	POTATO Injury % 7-22-02	Hairy N-shade Control % 7-22-02
1	Untreated Check							7.3	0.0	0.0	5.0	0.0
2	Dual Magnum	7.62	EC	1.0	PT/A	PRE	A	4.3	75.0	83.3	2.3	90.0
2	Matrix	25	WG	1.5	OZ WT/A	PRE	A					
3	Spartan	75	WG	0.156	LB/A	PRE	A	12.3	100.0	100.0	3.0	100.0
3	Prowl	3.3	EC	1.8	PT/A	PRE	A					
4	Spartan	75	WG	0.25	LB/A	PRE	A	25.0	100.0	100.0	12.3	100.0
4	Prowl	3.3	EC	1.8	PT/A	PRE	A					
5	Spartan	75	WG	0.156	LB/A	PRE	A	11.7	100.0	100.0	4.0	98.3
5	Prowl	3.3	EC	2.4	PT/A	PRE	A					
6	Spartan	75	WG	0.25	LB/A	PRE	A	16.7	100.0	100.0	14.0	100.0
6	Prowl	3.3	EC	2.4	PT/A	PRE	A					
7	Valor	51	WG	0.094	LB/A	PRE	A	7.0	100.0	100.0	5.7	100.0
7	Prowl	3.3	EC	1.8	PT/A	PRE	A					
8	Valor	51	WG	0.126	LB/A	PRE	A	7.0	100.0	100.0	4.0	96.7
8	Prowl	3.3	EC	1.8	PT/A	PRE	A					
9	Valor	51	WG	0.094	LB/A	PRE	A	11.3	100.0	100.0	6.3	100.0
9	Prowl	3.3	EC	2.4	PT/A	PRE	A					
10	Valor	51	WG	0.126	LB/A	PRE	A	6.0	100.0	100.0	2.0	100.0
10	Prowl	3.3	EC	2.4	PT/A	PRE	A					
11	Valor	51	WG	0.094	LB/A	PRE	A	11.7	100.0	100.0	5.7	100.0
11	Outlook	6.0	EC	1	PT/A	PRE	A					
12	Spartan	75	WG	0.156	LB/A	PRE	A	14.3	100.0	100.0	8.7	100.0
12	Outlook	6.0	EC	1	PT/A	PRE	A					
13	Valor	51	WG	0.094	LB/A	PRE	A	6.3	98.3	98.3	2.0	100.0
14	Valor	51	WG	0.126	LB/A	PRE	A	9.0	100.0	100.0	7.3	100.0
15	Valor	51	WG	0.188	LB/A	PRE	A	12.3	100.0	100.0	6.3	100.0
16	Valor	51	WG	0.25	LB/A	PRE	A	7.0	100.0	100.0	3.7	96.7
LSD (P=.01)								7.37	32.89	32.34	9.50	30.07
Standard Deviation								3.28	14.65	14.40	4.23	13.39
CV								31.02	15.56	15.21	73.35	13.91
Grand Mean								10.58	94.17	94.69	5.77	96.25

Potato Weed Control With Spartan, Valor and Prowl

Colorado State University

Trial ID: POTO022 **Cooperator:** CPAC
Location: Center, CO **Investigator:** Dr. Scott Nissen, Jim Sebastian

Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	Appl Code	Lambs-quarters Control % 7-22-02	Hairy N-shade Control % 8-16-02	Lambs-quarters Control % 8-16-02	Pigweed Control % 8-16-02	Green Foxtail Control % 8-16-02
1	Untreated Check							66.7	0.0	0.0	0.0	0.0
2	Dual Magnum	7.62	EC	1.0	PT/A	PRE	A	91.7	75.0	83.3	90.0	99.0
2	Matrix	25	WG	1.5	OZ WT/A	PRE	A					
3	Spartan	75	WG	0.156	LB/A	PRE	A	100.0	100.0	100.0	100.0	100.0
3	Prowl	3.3	EC	1.8	PT/A	PRE	A					
4	Spartan	75	WG	0.25	LB/A	PRE	A	100.0	93.3	100.0	100.0	100.0
4	Prowl	3.3	EC	1.8	PT/A	PRE	A					
5	Spartan	75	WG	0.156	LB/A	PRE	A	100.0	98.3	98.3	95.0	100.0
5	Prowl	3.3	EC	2.4	PT/A	PRE	A					
6	Spartan	75	WG	0.25	LB/A	PRE	A	100.0	100.0	100.0	100.0	100.0
6	Prowl	3.3	EC	2.4	PT/A	PRE	A					
7	Valor	51	WG	0.094	LB/A	PRE	A	100.0	100.0	100.0	100.0	100.0
7	Prowl	3.3	EC	1.8	PT/A	PRE	A					
8	Valor	51	WG	0.126	LB/A	PRE	A	100.0	100.0	100.0	95.7	100.0
8	Prowl	3.3	EC	1.8	PT/A	PRE	A					
9	Valor	51	WG	0.094	LB/A	PRE	A	100.0	100.0	100.0	95.0	90.0
9	Prowl	3.3	EC	2.4	PT/A	PRE	A					
10	Valor	51	WG	0.126	LB/A	PRE	A	100.0	98.3	100.0	98.3	95.7
10	Prowl	3.3	EC	2.4	PT/A	PRE	A					
11	Valor	51	WG	0.094	LB/A	PRE	A	100.0	100.0	99.0	100.0	100.0
11	Outlook	6.0	EC	1	PT/A	PRE	A					
12	Spartan	75	WG	0.156	LB/A	PRE	A	100.0	100.0	100.0	100.0	100.0
12	Outlook	6.0	EC	1	PT/A	PRE	A					
13	Valor	51	WG	0.094	LB/A	PRE	A	100.0	98.3	90.0	98.3	80.0
14	Valor	51	WG	0.126	LB/A	PRE	A	100.0	100.0	100.0	95.0	96.7
15	Valor	51	WG	0.188	LB/A	PRE	A	100.0	100.0	100.0	100.0	100.0
16	Valor	51	WG	0.25	LB/A	PRE	A	96.7	95.0	93.3	93.3	91.7
LSD (P=.01)								33.17	9.14	12.17	12.30	12.46
Standard Deviation								14.77	4.07	5.42	5.48	5.55
CV								15.2	4.47	5.93	6.0	6.11

Potato Weed Control With Spartan, Valor and Prowl

Colorado State University

Trial ID: POTO022 — **Cooperator: CPAC**

Location: Center, CO — **Investigator: Dr. Scott Nissen, Jim Sebastian**

Crop Code							POTATO
Part Rated							Yield
Rating Data Type							CWT/AC
Rating Date							9-26-02
Trt No.	Treatment Name	Form Conc	Form Type	Rate	Rate Unit	Grow Stg	Appl Code	
1	Untreated Check							183
2	Dual Magnum	7.62	EC	1.0	PT/A	PRE	A	263
2	Matrix	25	WG	1.5	OZ WT/A	PRE	A	
3	Spartan	75	WG	0.156	LB/A	PRE	A	323
3	Prowl	3.3	EC	1.8	PT/A	PRE	A	
4	Spartan	75	WG	0.25	LB/A	PRE	A	299
4	Prowl	3.3	EC	1.8	PT/A	PRE	A	
5	Spartan	75	WG	0.156	LB/A	PRE	A	277
5	Prowl	3.3	EC	2.4	PT/A	PRE	A	
6	Spartan	75	WG	0.25	LB/A	PRE	A	260
6	Prowl	3.3	EC	2.4	PT/A	PRE	A	
7	Valor	51	WG	0.094	LB/A	PRE	A	240
7	Prowl	3.3	EC	1.8	PT/A	PRE	A	
8	Valor	51	WG	0.126	LB/A	PRE	A	293
8	Prowl	3.3	EC	1.8	PT/A	PRE	A	
9	Valor	51	WG	0.094	LB/A	PRE	A	230
9	Prowl	3.3	EC	2.4	PT/A	PRE	A	
10	Valor	51	WG	0.126	LB/A	PRE	A	289
10	Prowl	3.3	EC	2.4	PT/A	PRE	A	
11	Valor	51	WG	0.094	LB/A	PRE	A	300
11	Outlook	6.0	EC	1	PT/A	PRE	A	
12	Spartan	75	WG	0.156	LB/A	PRE	A	298
12	Outlook	6.0	EC	1	PT/A	PRE	A	
13	Valor	51	WG	0.094	LB/A	PRE	A	297
14	Valor	51	WG	0.126	LB/A	PRE	A	271
15	Valor	51	WG	0.188	LB/A	PRE	A	281
16	Valor	51	WG	0.25	LB/A	PRE	A	303
LSD (P=.01)								141.1
Standard Deviation								62.9
CV								22.81

2002 –Use of Funds Report

Report on funds used rounded to the nearest dollar.

1. **Project labor**

PI has 9 month contract (summer salary)	1.5 week	$2,250
Rcscarch associatc	1 week	$875
Student hourly	3 days	$240

Total Labor $3,365

2. **Project Travel:** Four trips of two days each with meals and lodging for 1-2 people ($200/trip vehicle charges, rooms $50/night, meals $25/day).
Total travel $1,900

3. **Project Chemicals: $0.0**

4. **Project Ag Supplies: $0.0**

5. **Project Equipment: $0.0**

6. **Project Misc.**
Total Misc. $0.0

Total expenses **$5,265**

SLVRCC Funding **$4,000**