-				Cacal of and	מוות כסט אבט רמוותs)	5):				CSU Potato Breeding Program:	eeding Prograi
										(David Holm)	
Year	Project	Principal			Amount						
	Funded	Investigator	Dept	Account	Awarded	Commitment				Date	Received
0000										Dec-03	51,942.45
2003 F	2003 Potato Disease	Zink, R.	3043	3043 015347/153476	3,000.00	Yr 1/5				Nov-04	38,937.41
2003 P	2003 Potato Biochemistry	Vivanco, J.	1173	1173 015333/153336	24,498.00 Yr 4/5	Yr 4/5				Feb-05	
u.	Funds Allocated				27,498.00					Nov-06	9
2003 A	2003 AES Dir Office Balance	Se	3001	3001 015390/153906	15,000.00	SLV Potato Pro	SLV Potato Processing Project			Feb-07	
2003 T	2003 Total Potato Royalty Funds Received	/ Funds Received			42,498.00		2003 Royalty Rec'd	42,498.38			
							Allocated out	(24,498.00)			
2004 T	2004 Total Potato Royalty Funds Received	/ Funds Received		11/4/2004	31,857.89		Balance CF 2004	18,000.38	6/30/2004		
2004 P	2004 Potato Disease	Zink, R.	3043	3043 015347/153476	3,000.00 Yr 2/5	Yr 2/5					
2004 P	2004 Potato Biochemistry	Vivanco, J.	1173	1173 015333/15336	25,000.00	Yr 5/5	2004 Royalty Rec'd	31,857.89			
2004 F	2004 Funds Allocated				28,000.00		Allocated out	(31,000.00)			
2004 A	2004 AES Dir Office Balance	9	3001	3001 015390/153906	18,858.27		Balance Available	18,858.27			
2003 S	2003 SLV Potato Processing Project Support	ng Project Support			(15,000.00)		2004 Royalty Rec'd	4,158.54			
2004 A	2004 AES Dir Office Balance	Jce			3,858.27		SLV Proc Proj Commir	(15,000.00)			
2004 T	2004 Total Potato Royalty Funds Received	/ Funds Received		2/24/2005	4,158.54		Uncommitted Bal		6/30/2005		
2004 A	2004 AES Dir Office Balance	nce			8,016.81				FRS		
2005 P	2005 Potato Royalty Funds Received	Is Received		12/6/2005	33,039.13						
2005 P	2005 Potato Royalty Funds Received	Is Received		12/29/2005	1,534.99						
2005 P	2005 Potato Biochemistry Vivanco, J.	Vivanco, J.	1173	1173 015333/153336	(14,105.00)	(14,105.00) Final Amount					
2005 A	2005 AES Dir Office Balance	- Jce	3001	3001 015390/153906	28,485.93						
A	Add Back: SLVRC Balance Unused	3alance Unused			10,042.04						
2006 A	2006 AES Dir Office Balance	acu			38,527.97						
2007 P	2007 Potato Disease			153476	(6,000.00) Yr	۲̈́					
2007 S	2007 SLVRC Infrastructural Support	al Support			32,527.97						
2007 P	2007 Ptotao Processing Facility Support	acility Support	3043		(32,527.00)						
2007 P	2007 Potato Royalty Funds Received	Is Received			50,958.72						
2007 P	2007 Potato Royalty Funds Received	Is Received			4,704.92						
2007 A	2007 AES Dir Office Balance	JCe	3001		55.664.61						



### The Colorado Potato Breeding and Selection Program- Photo Essay





Potato flowers are complete since they contain both female and male parts.



Most new potato cultivars originate from the cross pollination of parent plants. This photo illustrates removal of the anthers (male part) in preparation for cross pollination.



Pollen is extracted from the anthers for cross pollination.



Pollen is transferred to the stigma (female part) of the selected female parent.



A small tomato-like berry or seed ball develops after pollination, if successful fertilization takes place.



Each seed ball may contain less than 100 seeds to a few 100 small seeds. Each seed is genetically different and represents a potential new potato cultivar.



The seeds are germinated in the greenhouse to produce seedling plants.



Several thousand seedlings are grown in the greenhouse each year. This increases the probability of finding improved cultivars since about 200,000 seedlings are grown for each cultivar named and released.



The seedling plants are grown to maturity to produce tubers in the greenhouse. Each tuber can differ in appearance, cooking qualities, and several other important characteristics. These tubers all came from one cross (same parents) displaying the great amount of genetic variation in potatoes.



Seedling tubers produced in the greenhouse are planted in the field the following year as single hills. The tubers are planted three-feet apart to allow for easy separation and identification at harvest.



When the single hills are harvested, selection is done to identify potential new cultivars. "Wild" types (like pictured above) are discarded because of ,long stolons and late maturity.



These tubers were also discarded because of a serious grade defect. Selection in the single hills is primarily based on tuber appearance.



The following year, selections from the single hills are increased for further evaluation. Each single hill is now called a clone and will carry a unique designation until discarded or named.



It takes 10-12 years of evaluation before naming a new cultivar. In the end, a new cultivar should be superior to existing cultivars in some way such as increased yield, resistance to pests and stresses or a higher percentage of US No. 1 tubers.



The long-term process of developing a new potato cultivar fosters collaborations among growers, shippers, processors, researchers, and extension personnel.



Knowledge to Go Places

## The Development of a New Potato Cultivar

Select parents for crossing and true seed production in Year 1 the greenhouse.

Year 2 Produce seedling tubers from true seed in the

> 70,000-80,000 seedling tubers planted in the field as single hills. Several thousand tubers are obtained from other breeding programs. Initial selection of this material takes place at harvest. First cycle of field selection.

Twelve-hills of each single-hill selection are planted. Second cycle of field selection.

> Proliminary Selections 1 (P1). Third cycle of field selection (48 plant tuber-unit seed increase), initial evaluations for chipping qualities (chip color after various storage regimes and specific gravity) are conducted this year and subsequently.

Preliminary Selection 2 (P2). Fourth cycle of field selection (96 plant tuber-unit seed increase). Initial evaluations to characterize selections for blackspot bruise potential, storage weight loss, dormancy, and enzymatic browning. Initial evaluations for french fry potential ( french fry color and specific gravity) are conducted this year and subsequently. Evaluations for chipping qualities are continued.

intermediate Selections, Fifth cycle of field selection. Initial data collected on yield, grade, and growth characteristics. Plant a 144 plant tuber-unit seed increase and a 2 rep X 25 plants intermediate yield trial (IYT).

Advanced Selections: Includes selections that have advanced from the tYT. Additionally selections are included that have graduated from the Southwest. Regional and Western Regional Trials. The advanced yield trials for reds, specialty types, and chippers are planted with entries in the Western Regional Red, Specialty and Chip Trials. Selections are in the Sti-7th and 12+ cycles of field selection. All advanced yield trials (AYT) have 4 reps x 25 plants. Sixth- and seventh- year field selections respectively have a 400/1,500 plant tuber-unit seed increase.

Selections in the sixth cycle of selection are indexed for viruses and cleanup/micropropagation is initiated. Testing for ring rot and PLRV reaction is also initiated at this stage and continues as needed. Selections in the 7th cycle of field selection are entered into cultural management trials and post hurvest disease reaction (dry not and soft rot) evaluations.

All 8th year selections have a 1/2 acre tuber-unit seed increase planted. These selections are entered in the Southwestern Regional Trials (4 locations - CO, TX, two in CA). Cultural management trials and post harvest disease reaction evaluations continue as needed.

All 9th year or older selections generally have a 1 acre or greater seed increase. These selections are entered in the Western Regional Trials (4 trials): main (russets and long whites), red, specialty, and chip. The Western Coordinating Committee (WCC-27) directs these trials at 10+ locations in the Western United States such year. Cultural management trials and post harvest disease reaction availables continue as needed.

Growerlindustry evaluations. The Colorado Potato Breeding and Solection Project roles on the cooperation of several growers, shippers, and processors to evaluate advanced selections for adaptability and marketibility.

Released as a named cultivar.

















Year 3

Year 4

Year 5

Year 6

Year 7

Year 8-9, 14+

Year 10

Year 11+

Year 14+

# **CPAC Research Committee Project Funding 2005 - 2006**

 Dr. Richard T. Zink

 Dr. Robert D. Davidson
 \$20,000.00

 Merlin A. Dillon
 \$9,000.00

 David G. Holm
 \$21,000.00

 Research Assoc.
 \$37,000.00

 Dr. Cecil Stushnoff
 \$30,000.00

Dr. Richard T. Zink
Russell E. Ingham \$20,000.00

Samuel Essah <u>\$25,000.00</u>

TOTAL: \$ 162,000.00

## 05-06 CPAC Funding

## Request Funded

Researcher David Holm Cecil Stushnoff Samuel Essah Prithiviraj/Vivanco Rick Zink Merle Dillion Scott Nissen Russ Ingham Agro Engineering	Research Proposals Breeding and Assisant MOU Funding Value Added Health Benefits Cultivar Management Screening for Nematode Resistance Disease Management Bio-fumigation 2-4-D in Red Potatoes Columbia Root Knot Nematodes Aphid Supression	60500 30688 30000 19200 22500 9900 5300 24220 31560	58000 15000 (-1, 15,000 25000 0 20000 9000 0 20000 17670	= 30,100.~
			179,670.	
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- Example of letter -

2006 Project Proposal for the CPAC Research Committee - Area II; San Luis Valley, CO

Investigator(s)	Project Title	S Amount	Rank
Holm, David & P. Naranjo	Potato Breeding and Selection for Colorado	005,09	000 0
Stushnoff, Cecil, D. Holm & H. Thompson	Improving Value-Added Health Attributes of Colorado Potatoes	23,225	
Essah, Samuel Y.C.	Development of Cultivar Specific Management Profiles for New	30 000 2	
	and Existing Potato Cultivars		
Davidson, Robert & A. Houser	Potato Disease Management	25,000 25	000
Dillon, Merlin & R. Ingham	Using Biocontrol Crops to Enhance Potato Production	9,000	000
Bond, Craig & J.K. Bond	Colorado Consumer Preferences for Specialty Potato Varieties	19,736	movel
Sastry, Jayanty	Post Harvest Evaluations of Potatoes (no formal project submission)	15,000 /0	000
Ingham, Russ, et al	Management of Nematodes on Potato in the San Luis Valley, CO	26,300 15,	200
Agro-Engineering; Thompson, Kirk, et al	Phytophthora erythroseptica	38,850 (12,0	200
Agro-Engineering; Jeannine Willet Radtke	Aphid Suppression and Monitoring Program	87	000
Other			
Other			
Other			
	Sub-Total	247,611	200
	Grand Total		
	Available		

More worldwps. ) Examine vestach ?\*
Field Wisite ) Exp. work w/ Erwina }\*

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Robert Live tem to CPAC Appropried 2005 133,000 to CSU 20,50
Approve Indepet as stated - Appropried 2006 Project Proposal for the CPAC Research Committee - Area II; San Luis Valley, CO 16,000 - 0 (& vestande Acc to 2006 Project Proposal for the CPAC Research Committee - Area II; San Luis Valley, CO 16,000 - 0 (& vestande Acc to 2006 Project Proposal for the CPAC Research Committee - Area II; San Luis Valley, CO 16,000 - 0 (& vestande Acc to 2006 Project Proposal for the CPAC Research Committee - Area II; San Luis Valley, CO 16,000 - 0 (& vestande Acc to 2006 Project Proposal for the CPAC Research Committee - Area II; San Luis Valley, CO 16,000 - 0 (& vestande Acc to 2006 Project Proposal for the CPAC Research Committee - Area II; San Luis Valley, CO 16,000 - 0 (& vestande Acc to 2006 Project Proposal for the CPAC Research Committee - Area II; San Luis Valley, CO 16,000 - 0 (& vestande Acc to 2006 Project Proposal for the CPAC Research Committee - Area II; San Luis Valley, CO 16,000 - 0 (& vestande Acc to 2006 Project Proposal for the CPAC Research Committee - Area II; San Luis Valley, CO 16,000 - 0 (& vestande Acc to 2006 Project Proposal for the CPAC Research Committee - Area II; San Luis Valley, CO 16,000 - 0 (& vestande Acc to 2006 Project Proposal for the CPAC Research COMMITTEE - Area II; San Luis Valley, CO 16,000 - 0 (& vestande Acc to 2006 Project Proposal for the CPAC Research COMMITTEE - Area II; San Luis Valley Proposal Proposal For Propos

Investigator(s)	Designet Title	
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Holm, David & P. Naranjo	Potato Breeding and Selection for Colorado	76
Stushnoff, Cecil, D. Holm & H. Thompson	Improving Value-Added Health Attributes of Colorado Potatoes	23,225 - (SW NO
Essah, Samuel Y.C.		30,000 25,000
	and Existing Potato Cultivars	
Davidson, Koden & A. Houser	Potato Disease Management	25,000 757000
Dillon, Merlin & R. Ingham	Using Biocontrol Crops to Enhance Potato Production	( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )
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Bond, Craig & J.K. Bond	Colorado Consumer Preferences for Specialty Potato Varieties	19,736 (To may heat me)
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Sastry, Jayanty	Post Harvest Evaluations of Potatoes (no formal project submission)	15,000 (40td off) 10,000
Ingnam, Kuss, et al	Management of Nematodes on Potato in the San Luis Valley, CO	26,300 (5,000
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Agra-Lugmoring, Inompour, MIN, et at	r nyiopninora eryinroseptica	38,850 (Face (5,000 1-,000
Agro-Engineering: Jeannine Willet Radtke	Aphid Suppression and Monitoring Program	2000
		333,
Other		
Other		
Other		
	Sub-Total	247,611
	Grand Total	ld la
	Available	((S),000) - For price

Struck - visit more growers Dave - Rouly RUSSERS - NK veplacement

180,000 Total



## **AGRO ENGINEERING**

#### "COMPREHENSIVE AGRICULTURAL AND WATER RESOURCE CONSULTING"

0210 ROAD 2 SOUTH ALAMOSA, CO 81101

PHONE (719) 852-4957

FAX 852-5146

TO:

Colorado Potato Administrative Committee - Research Subcommittee

DATE:

March 6, 2006

SUBJECT:

Contract for the Green Peach Aphid

Integrated Pest Management Program 2006

Agro Engineering, Inc. proposes to conduct the Green Peach Aphid Integrated Pest Management program which it has conducted since 1986. The program includes both suppression and monitoring of the Green Peach Aphid along with several other important insect pests of potatoes.

#### Suppression

Suppression procedures involving overwintering hosts of the Green Peach Aphid (GPA) will be conducted as in 2005 by Agro Engineering, Inc. (Agro) The 2005 Mapping program resulted in the detection of 43 new sites, with 97 peach or plum trees plus 4 groves of trees. The total number of sites treated each year was over 200 from 2001 to 2004. Trees from a number of those sites were removed, and with the prunus quarantine in place, we saw an overall decrease in prunus host trees. In 2005, our starting list of host tree sites was over 200, but inspections found no to few new shoots emerging following tree removal on a number of sites, and they were deleted from the list. Total number of sites for 2006 should be about 219. It should be a priority to pay for removal of as many prunus trees as possible. CPAC could again coordinate with the CCPGA to see if they would have funds available for that. Treatment area includes Monte Vista. Del Norte, Center, and the surrounding area as well as some northwest Alamosa county locations. Inspections will be done on removal sites until it is clear that no shoots will survive. Treatment of overwintering hosts will be done through the use of dormant oil applications, which are of low hazard to people and the environment. Treatment operations will be completed on or before May 10, 2006, unless extenuating circumstances arise which may affect performance or safety to residents or operators.

A public relations campaign will be conducted, including submitting a news article to local papers which describes the program. Letters and permission slips will be sent to homeowners and personal contact will be made before and after spray treatment when possible. Agro is licensed as a commercial applicator in the State of Colorado. Records will be maintained in accordance with State of Colorado and Federal laws and regulations.

#### Cost Proposal for Suppression Program

#### Plum & Peach Trees - spray / inspect / prune shoots

1) Materials	\$ 500.00
Sprayer maintenance	\$ 200.00
2) Mileage	\$2,000.00
3) Labor for Dormant Oil Treatment	\$ 12,360.00
(Must be done by Commercial Applicators)	
4) Licensing and Insurance	\$ 2,150.00
5) Public Relations	\$ 300.00
6) Record keeping and Final Report	\$ 800.00
Suppression Total	\$ 18,310.00

Agro Engineering, Inc. will be paid by the SLV Research Center Committee for the GPA Suppression Program. The full sum of \$\frac{18,310}{2006}\$ will be paid on September 30, 2006.

## Proposal for Additional mapping of Prunus GPA Host Trees in the SLV

Host tree mapping was done in 2005. This activity should be conducted every two or three years to ensure that newly planted trees are discovered. Since so many new tree locations were detected in 2005, mapping is less necessary for 2006 than treatment and removal.

Suggested schedule for mapping: 2007, 2009, 2011

## Proposal for Eradication

Agro proposes to identify host trees that may be removed as part of the suppression program. We would arrange with one or more local contractors to remove trees and will follow up to be sure work is done properly. Eradication billing from the contractor would be forwarded to CPAC after the work is approved.

Eradication costs not to exceed . . . . . . . . . . . . . . . . \$ 3,000.00.

#### Monitoring

Two proposals are included for the Monitoring phase of the Integrated Pest Management Program for your consideration. The first will include setting out a valley wide system of 34 yellow pan traps in the same locations as during the 2001 - 2004 trapping programs, and monitoring the insects in the traps on a weekly basis. This would allow insect movement to be tracked in areas representative of the SLV, and those trap counts can be compared with past years. The full season cost proposal is for the trapping schedule that has been used since 2002, the first year that the June trapping was eliminated. Traps will be set out on June 23 and collected each week through September 15, 2005, when monitoring will cease.

The second program would consist of 15 traps, with the same locations as in 2005. This would provide good information about the central SLV, but those counts do not correlate with historical data. The second proposal is for the reduced season and reduced trap program similar to what CCPGA funded in 2005. The traps will be set out on June 23 and collected each week through August 11<sup>th</sup>, when monitoring would cease. Population peaks of GPA and psyllids will be missed with the timing of this trapping. A shift of two or three weeks later might cover those peaks, but could result in missing the miscellaneous population peak, which is thought to be the major cause of mosaic spread.

Insects will be captured weekly and brought to Agro Engineering for identification. Agro proposes to continue to count green peach aphids, potato aphids, Russian wheat aphids, miscellaneous aphids, leafhoppers, and psyllids. Trap counts will be faxed each week to the CSU Research Center and to the CPAC office for posting and colored maps will be mailed to both sites. Insect counts will also be available on the Agro Engineering web site.

Cost Proposal for Monitoring Program	June 23-Sept 15 34 traps & 13 weeks Program	June 23-Aug11 15 traps & 8 weeks Program
1) Materials	\$750.00	\$350.00
2) Mileage	\$1,735.00	\$515.00
3) Labor for Pan Trap Collection, Insect Ider	ntification,	
Information processing, and dissemination	\$11,675.00	\$5,650.00
5) Final Report	\$600.00	<u>\$600.00</u>
Total Monitoring	\$14,760.00	\$7,115.00

"COMPREHENSIVE AGRICULTURAL AND WATER RESOURCE CONSULTING"

0210 ROAD 2 SOUTH ALAMOSA, CO 81101

PHONE (719) 852-4957

FAX 852-5146

TO:

Colorado Potato Administrative Committee - Research Subcommittee

DATE:

March 2, 2005

SUBJECT:

Contract for the Green Peach Aphid

Integrated Pest Management Program 2005

Agro Engineering, Inc. proposes to conduct the Green Peach Aphid Integrated Pest Management program which it has conducted since 1986. The program includes both suppression and monitoring of the Green Peach Aphid along with several other important insect pests of potatoes.

## Suppression

Suppression procedures involving overwintering hosts of the Green Peach Aphid (GPA) will be conducted as in 2004 by Agro Engineering, Inc. (Agro) Hundreds of additional plum trees were added with the 2000 and 2001 mapping programs and no mapping has been done since that time. Apricot trees were taken out of the spray program in 2001 because they were not a very good GPA host. The total number of sites treated each year has been over 200 since 2001. Trees from a number of those sites have been removed, and with the prunus quarantine in place, we are just beginning see an overall decrease in prunus host trees. We should again work with the CCPGA to remove as many prunus trees as possible. Treatment area includes Monte Vista, Del Norte, Center, and the surrounding area as well as some northwest Alamosa county locations. Inspections will be done on removal sites until it is clear that no shoots will survive. Treatment of overwintering hosts will be done through the use of dormant oil applications, which are of low hazard to people and the environment. Treatment operations will be completed on or before May 16, 2005, unless extenuating circumstances arise which may affect performance or safety to residents or operators.

A public relations campaign will be conducted, including sending a news article to local papers which describes the program. Letters and permission slips will be sent to homeowners and personal contact will be made before and after spray treatment when possible. Records will be maintained in accordance with the State of Colorado and Federal laws and regulations.

## Cost Proposal for Suppression Program

## Plum & Peach Trees - spray / inspect / prune shoots

1) Materials	\$ 500.00
Sprayer maintenance	\$ 200.00
2) Mileage	\$1,720.00
Labor for Dormant Oil Treatment	\$ 12,000.00
(Supervisor - \$50.00/hr x 4.5 weeks x 40 hrs	7
(Technician - \$25.00/hr x 4 weeks x 30 hrs	
5) Licensing and Insurance	\$ 2,150.00
6) Public Relations	\$ 300.00
7) Record keeping and Final Report	\$ 800.00
Suppression Total	<b>\$</b> 17,6 <b>7</b> 0.00

# Proposal for Additional mapping of Prunus GPA Host Trees in the SLV

Agro Engineering, Inc. proposes to map additional prunus trees, at time of bloom, to look for unknown host trees that are serving as a reservoir of Green Peach Aphids. The area to be mapped in 2005 would be started in the areas with the highest GPA counts from the 2004 mapping and extend as far outward from those points as time and or funding allows. Since no mapping has been done for four years and the number of sites on the treatment list is beginning to show a decline, this would be a good time to look for additional plum trees that could be treated or removed.

## Cost Proposal for GPA Host Tree Mapping

- 1) Labor for mapping . . . . . . . . . . . . . . . . (\$ 50.00/hr)
- 2) Vehicle mileage . . . . . . . . . . . . . . . . . (\$ .41/mile)

# Total for GPA mapping not to exceed . . . . \$ 3000.00 .

Agro Engineering, Inc. will be paid by the SLV Research Center Committee for the GPA Host Tree Mapping. The full sum of \$\_...\_\_will be paid on September 30, 2005.

## Monitoring

The Monitoring phase of the Integrated Pest Management Program will include setting out a valley wide system of 34 yellow pan traps, and monitoring the insects in the traps on a weekly basis. Agro Engineering proposes to keep all pan traps in those same locations as they have been in since 2001, so that insect movements to the north continue to be tracked and the remainder of the trap counts can be compared with past years.

Insects will be captured weekly and brought to Agro Engineering for identification. Agro proposes to continue to count total aphid numbers from the pan traps, as has been done since 1996, to determine timing of miscellaneous winged aphid population peaks that may be responsible for mosaic spread.

The cost proposal is for the reduced season trapping schedule that has been used since 2002. Traps will be set out on June 22 and collected each week through September 14, 2005, when monitoring will cease. Trap counts will be faxed each week to the CSU Research Center and to the CPAC office for posting and colored maps will be mailed to both sites. Insect counts will also be available on the Agro Engineering web site.

Cost Proposal for Monitoring Program	Short season
<ol> <li>Materials</li> <li>Mileage</li> <li>Labor for Pan Trap Collection         (\$30/hr x 13 hrs/wk x 13 weeks)</li> </ol>	\$750.00 \$1,735.00 \$5,070.00
4) Labor for Insect Identification (\$60/hr x 8 hrs/wk x 12 weeks)	\$5,760.00
5) Final Report	\$575.00
Total Monitoring	\$13,890.00
Total Suppression	\$17,670.00
Total Suppression and Monitoring	\$ 31,560.00

Billing Schedule: Billi

Billing will be submitted on September 30, 2005