

**The University of Western Ontario**  
**BIOLOGICAL AGENTS REGISTRY FORM**  
 Approved Biohazards Subcommittee: October 14, 2011  
 Biosafety Website: [www.uwo.ca/humanresources/biosafety/](http://www.uwo.ca/humanresources/biosafety/)

This form must be completed by each Principal Investigator holding a grant administered by the University of Western Ontario (UWO) or in charge of a laboratory/facility where the use of Level 1, 2 or 3 biological agents is described in the laboratory or animal work proposed. The form must also be completed if any work is proposed involving animals carrying zoonotic agents infectious to humans or involving plants, fungi, or insects that require Public Health Agency of Canada (PHAC) or Canadian Food Inspection Agency (CFIA) permits.

This form must be updated at least every 3 years or when there are changes to the biological agents being used.

Containment Levels will be established in accordance with Laboratory Biosafety Guidelines, 3rd edition, 2004, Public Health Agency of Canada (PHAC) or Containment Standards for Veterinary Facilities, 1<sup>st</sup> edition 1996, Canadian Food Inspection Agency (CFIA).

Electronically completed forms are to be submitted to Occupational Health and Safety, (OHS), (Support Services Building, Room 4190 or to [jstanle2@uwo.ca](mailto:jstanle2@uwo.ca)) for distribution to the Biohazards Subcommittee. For questions regarding this form, please contact the Biosafety Officer at extension 81135 or [biosafety@uwo.ca](mailto:biosafety@uwo.ca). If there are changes to the information on this form (excluding grant title and funding agencies), contact Occupational Health and Safety for a modification form. See website: [www.uwo.ca/humanresources/biosafety/](http://www.uwo.ca/humanresources/biosafety/).

Please ensure that all questions are fully and clearly answered. Failure to do so will lead to the form being returned, which will cause delays in your approval and frustration for you and your colleagues on the Committee.

**If you are re-submitting this form as requested by the Biohazards Subcommittee, please make modifications to the form in bold print, highlighted in yellow. Please re-submit forms electronically.**

PRINCIPAL INVESTIGATOR:	<b>Aiming Wang</b>
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EMERGENCY PHONE NUMBER(S):	<b>519 457-1470 ext 313</b>
EMAIL:	<b>aiming.wang@agr.gc.ca</b>

Location of experimental work to be carried out :

Building :	<u>AAFC</u>	Room(s):	<u>218</u>
Building :		Room(s):	
Building :		Room(s):	

**\*For work being performed at institutions affiliated with the University of Western Ontario, the Safety Officer for the institution where experiments will take place must sign the form prior to its being sent to the University of Western Ontario Biosafety Officer (See Section 15.0, Approvals).**

FUNDING AGENCY/AGENCIES: NSERC

GRANT TITLE(S): Towards a better understanding of molecular virus-plant interactions: components and intracellular trafficking of viral genome translation/replication complex

UNDERGRADUATE COURSE NAME(IF APPLICABLE): \_\_\_\_\_

List all personnel working under Principal Investigators supervision in this location:

Name	UWO E-mail Address	Date of Biosafety Training
Yinzi Li	<u>yli628@uwo.ca</u>	<u>Sept 3, 2009</u>
Quyue Pan	<u>qpan8@uwo.ca</u>	<u>August 20, 2010</u>

*note: both graduate students received training at AAFC*  
*A. Wang*



**Please include a ONE page research summary or teaching protocol in lay terms.  
Forms with summaries more than one page will not be reviewed.**

Plant viruses are obligate intracellular parasites that infect many major crops and cause yearly losses over multibillion dollars in the world. Potyviruses constitute the largest group of plant viruses, including approximately 30% of all known plant viruses. Some of the most agriculturally important potyviruses include Soybean mosaic virus (SMV). One of the common properties shared by plant potyviruses and other plant viruses is their relatively small genome with a very limited protein-coding capacity. Thus, these viral pathogens must interact with host cells to recruit an array of host proteins (host factors) and metabolites to fulfill their life cycles. Recent studies on virus-plant interactions have identified several host factors. It has been shown that some of them can be manipulated to generate genetic resistance against target viruses. Thus, a better understanding of molecular potyvirus-host interactions may result in new strategies to control plant potyviruses as well as other plant viruses. In search for host factors, in the previous funding cycle, we have screened out approximately 4000 host factor gene candidates using diverse tools such as microarray, yeast two-hybrid system, and expressed sequence tags. These candidate genes include genes coding for translation initiation factors that may be required for viral genome translation, RNA helicase proteins that may participate in viral RNA replication, assembly and transport, and vesicular transport proteins that may be essential for the intracellular trafficking of virus replication complexes. This proposal will enable the identification of genes in these three important gene groups required in potyviral infection, and further characterization of their roles in the formation, function and trafficking of the virus replication complex. Therefore, this proposal will advance our knowledge of the virus replication mechanism. It is anticipated that the new knowledge generated in this study will contribute to the development of novel antiviral strategies.

**1.0 Microorganisms**

1.1 Does your work involve the use of biological agents?  YES  NO  
 (non-pathogenic and pathogenic biological agents including but not limited to bacteria and other microorganisms, viruses, prions, parasites or pathogens of plant or animal origin)? If no, please proceed to Section 2.0

Do you use microorganisms that require a permit from the CFIA?  YES  NO

If YES, please give the name of the species \_\_\_\_\_

What is the origin of the microorganism(s)? \_\_\_\_\_

Please describe the risk (if any) of escape and how this will be mitigated:

n/a

*Please attach the CFIA permit.*

Please describe any CFIA permit conditions:

n/a

1.2 Please complete the table below:

Full Scientific Name of Biological Agent(s)* (Be specific)	Is it known to be a human pathogen? YES/NO	Is it known to be an animal pathogen? YES/NO	Is it known to be a zoonotic agent? YES/NO	Maximum quantity to be cultured at one time? (in Litres)	Source/ Supplier	PHAC or CFIA Containment Level
<i>Soybean mosaic virus</i>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	100 plants	Open field in Ontario	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 2+ <input type="checkbox"/> 3
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No			<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 2+ <input type="checkbox"/> 3
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No			<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 2+ <input type="checkbox"/> 3
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No			<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 2+ <input type="checkbox"/> 3
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No			<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 2+ <input type="checkbox"/> 3
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No			<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 2+ <input type="checkbox"/> 3
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No			<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 2+ <input type="checkbox"/> 3
	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No			<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 2+ <input type="checkbox"/> 3

\*Please attach a Material Safety Data Sheet or equivalent from the supplier if the bacterium used is not on this link:  
[http://www.uwo.ca/humanresources/docandform/docs/ohs/CFIA\\_Ecoli\\_list.pdf](http://www.uwo.ca/humanresources/docandform/docs/ohs/CFIA_Ecoli_list.pdf)

Additional Comments: \_\_\_\_\_

**2.0 Cell Culture**

2.1 Does your work involve the use of cell cultures?  YES  NO  
 (If NO, please proceed to Section 3.0)

2.2 Please indicate the type of primary cells (i.e. derived from fresh tissue) that will be grown in culture:

Cell Type	Is this cell type used in your work?	Source of Primary Cell Culture Tissue	AUS Protocol Number
Human	<input type="checkbox"/> Yes <input type="checkbox"/> No		Not applicable
Rodent	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Non-human primate	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Other (specify)	<input type="checkbox"/> Yes <input type="checkbox"/> No		

2.3 Please indicate the type of established cells that will be grown in culture in:

Cell Type	Is this cell type used in your work?	Specific cell line(s)*	Containment Level of each cell line	Supplier / Source of cell line(s)
Human	<input type="checkbox"/> Yes <input type="checkbox"/> No			
Rodent	<input type="checkbox"/> Yes <input type="checkbox"/> No			
Non-human primate	<input type="checkbox"/> Yes <input type="checkbox"/> No			
Other (specify)	<input type="checkbox"/> Yes <input type="checkbox"/> No			

\*Please attach a Material Safety Data Sheet or equivalent from the supplier. (For more information, see [www.atcc.org](http://www.atcc.org))

2.4 For above named cell types(s) indicate PHAC or CFIA containment level required  1  2  2+  3

Additional Comments: \_\_\_\_\_

**3.0 Use of Human Source Materials**

3.1 Does your work involve the use of human source materials?  YES  NO  
 If no, please proceed to Section 4.0

3.2 Indicate in the table below the Human Source Material to be used.

Human Source Material	Source/Supplier /Company Name	Is Human Source Material Infected With An Infectious Agent? YES/UNKNOWN	Name of Infectious Agent (If applicable)	PHAC or CFIA Containment Level (Select one)
Human Blood (whole) or other Body Fluid		<input type="checkbox"/> Yes <input type="checkbox"/> Unknown		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 2+ <input type="checkbox"/> 3
Human Blood (fraction) or other Body Fluid		<input type="checkbox"/> Yes <input type="checkbox"/> Unknown		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 2+ <input type="checkbox"/> 3
Human Organs or Tissues (unpreserved)		<input type="checkbox"/> Yes <input type="checkbox"/> Unknown		<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 2+ <input type="checkbox"/> 3
Human Organs or Tissues (preserved)		Not Applicable		Not Applicable

Additional Comments: \_\_\_\_\_

**4.0 Genetically Modified Organisms and Cell lines**

4.1 Will genetic modifications be made to the microorganisms, biological agents, or cells described in Sections 1.0 and 2.0?  YES  NO If NO, please proceed to Section 5.0

4.2 Will genetic modification(s) involving plasmids be done?  YES, complete table below  NO

Bacteria Used for Cloning *	Plasmid(s) **	Source of Plasmid	Gene Transformed or Transfected	Will there be a change due to transformation of the bacteria?	Will there be a change in the pathogenicity of the bacteria after the genetic modification?	What are the consequences due to the transformation of the bacteria?

\* Please attach a Material Safety Data Sheet or equivalent if available.

\*\* Please attach a plasmid map.

\*\*\*No Material Safety Data Sheet is required for the following strains of E. coli:

[http://www.uwo.ca/humanresources/docandform/docs/ohs/CFIA\\_Ecoli\\_list.pdf](http://www.uwo.ca/humanresources/docandform/docs/ohs/CFIA_Ecoli_list.pdf)

4.3 Will genetic modification(s) of bacteria and/or cells involving viral vectors be made?

YES, complete table below  NO

Virus Used for Vector Construction	Vector(s) *	Source of Vector	Gene(s) Transduced	Describe the change that results from transduction

\* Please attach a Material Safety Data Sheet or equivalent.

4.3.1 Will virus be replication defective?  YES  NO

4.3.2 Will virus be infectious to humans or animals?  YES  NO

4.3.3 Will this be expected to increase the containment level required?  YES  NO

**5.0 Will genetic sequences from the following be involved?**

- ◆ HIV  NO  YES, specify
- ◆ HTLV 1 or 2 or genes from any Level 1 or Level 2 pathogens  NO  YES, specify
- ◆ SV 40 Large T antigen  NO  YES
- ◆ E1A oncogene  NO  YES
- ◆ Known oncogenes  NO  YES, specify
- ◆ Other human or animal pathogen and or their toxins  NO  YES, specify

5.1 Is any work being conducted with prions or prion sequences?  NO  YES

Additional Comments: \_\_\_\_\_

## 6.0 Human Gene Therapy Trials

6.1 Will human clinical trials be conducted involving a biological agent?  YES  NO  
(including but not limited to microorganisms, viruses, prions, parasites or pathogens of plant or animal origin)  
If no, please proceed to Section 7.0

6.2 If YES, please specify which biological agent will be used:  
Please attach a full description of the biological agent.

6.3 Will the biological agent be able to replicate in the host?  YES  NO

6.4 How will the biological agent be administered?

6.5 Please give the Health Care Facility where the clinical trial will be conducted:

6.6 Has human ethics approval been obtained?  YES, number:  NO  PENDING

## 7.0 Animal Experiments

7.1 Will live animals be used?  YES  NO If NO, please proceed to section 8.0

7.2 Name of animal species to be used

7.3 AUS protocol #

7.4 List the location(s) for the animal experimentation and housing.

7.5 Will any of the agents listed in section 4.0 be used in live animals  
 NO  YES, specify:

7.6 Will the agent(s) be shed by the animal:  
 YES  NO, please justify:

## 8.0 Use of Animal species with Zoonotic Hazards

8.1 Will any animals with zoonotic hazards or their organs, tissues, lavages or other body fluids including blood be used (see list below)?  YES  NO - If NO, please proceed to section 9.0

8.2 Will live animals be used?  YES  NO

8.3 If YES, please specify the animal(s) used:

- |                             |  |                             |
|-----------------------------|--|-----------------------------|
| ◆ Pound source dogs         | <input type="checkbox"/> YES                     | <input type="checkbox"/> NO |
| ◆ Pound source cats         | <input type="checkbox"/> YES                     | <input type="checkbox"/> NO |
| ◆ Cattle, sheep or goats    | <input type="checkbox"/> YES, species            | <input type="checkbox"/> NO |
| ◆ Non-human primates        | <input type="checkbox"/> YES, species            | <input type="checkbox"/> NO |
| ◆ Wild caught animals       | <input type="checkbox"/> YES, species & colony # | <input type="checkbox"/> NO |
| ◆ Birds                     | <input type="checkbox"/> YES, species            | <input type="checkbox"/> NO |
| ◆ Others (wild or domestic) | <input type="checkbox"/> YES, specify            | <input type="checkbox"/> NO |

8.4 If no live animals are used, please specify the source of the specimens:

## 9.0 Biological Toxins and Hormones

9.1 Will toxins or hormones of biological origin be used?  YES  NO If NO, please proceed to Section 10.0

9.2 If YES, please name the toxin(s) or hormones(s)  
Please attach information, such as a Material Safety Data Sheet, for the toxin(s) used.

9.3 What is the LD<sub>50</sub> (specify species) of the toxin or hormone

9.4 How much of the toxin or hormone is handled at one time\*?

9.5 How much of the toxin or hormone is stored\*?

9.6 Will any biological toxins or hormones be used in live animals?  YES  NO  
If YES, Please provide details:

\*For information on biosecurity requirements, please see:

[http://www.uwo.ca/humanresources/docandform/docs/healthandsafety/biosafety/Biosecurity\\_Requirements.pdf](http://www.uwo.ca/humanresources/docandform/docs/healthandsafety/biosafety/Biosecurity_Requirements.pdf)

Additional Comments: \_\_\_\_\_

## 10.0 Insects

10.1 Do you use insects?  YES  NO - If NO, please proceed to Section 11.0

10.2 If YES, please give the name of the species.

10.3 What is the origin of the insect?

10.4 What is the life stage of the insect?

10.5 What is your intention?  Initiate and maintain colony, give location:  
 "One-time" use, give location:

10.6 Please describe the risk (if any) of escape and how this will be mitigated:

10.7 Do you use insects that require a permit from the CFIA permit?  YES  NO  
If YES, Please attach the CFIA permit & describe any CFIA permit conditions:

### 11.0 Plants

- 11.1 Do you use plants?  YES  NO - If NO, please proceed to Section 12.0
- 11.2 If YES, please give the name of the species. **Arabidopsis, Nicotiana benthamaina and soybean**
- 11.3 What is the origin of the plant? **Canada**
- 11.4 What is the form of the plant (seed, seedling, plant, tree...)? **plants**
- 11.5 What is your intention?  Grow and maintain a crop  "One-time" use
- 11.6 Do you do any modifications to the plant?  YES  NO  
If yes, please describe:
- 11.7 Please describe the risk (if any) of loss of the material from the lab and how this will be mitigated:  
**n/a**
- 11.8 Is the CFIA permit attached?  YES  NO  
If YES, Please attach the CFIA permit & describe any CFIA permit conditions:

### 12.0 Import Requirements

- 12.1 Will any of the above agents be imported?  YES, country of origin  NO  
If NO, please proceed to Section 13.0
- 12.2 Has an Import Permit been obtained from HC for human pathogens?  YES  NO
- 12.3 Has an import permit been obtained from CFIA for animal or plant pathogens?  YES  NO
- 12.4 Has the import permit been sent to OHS?  YES, please provide permit #  NO

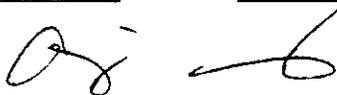
### 13.0 Training Requirements for Personnel Named on Form

All personnel named on the above form who will be using any of the above named agents are required to attend the following training courses given by OHS:

- ◆ Biosafety
- ◆ Laboratory and Environmental/Waste Management Safety
- ◆ WHMIS (Western or equivalent)
- ◆ Employee Health and Safety Orientation

As the Principal Investigator, I have ensured that all of the personnel named on the form who will be using any of the biological agents in Sections 1.0 to 9.0 have been trained.

**An X in the check box indicates you agree with the above statement...**   
**Enter Your Name** Aiming Wang **Date:** Feb. 27, 2012



**14.0 Containment Levels**

14.1 For the work described in sections 1.0 to 9.0, please indicate the highest HC or CFIA Containment Level required.  1  2  2+  3

14.2 Has the facility been certified by OHS for this level of containment?

- YES, location and date of most recent biosafety inspection:
- NO, please certify
- NOT REQUIRED for Level 1 containment

14.3 Please indicate permit number (not applicable for first time applicants): **B10-OTH-007**

**15.0 Procedures to be Followed**

15.1 Are additional risk reduction measures necessary beyond containment level 1, 2, 2+ or 3 measures that are unique to these agents?  YES  NO  
If YES please describe:

15.2 Please outline what will be done if there is an exposure to the biological agents listed such as a needlestick injury or an accidental splash:  
**As SMV dese not infect human being, there is no particular procedure other than washing up required.**

15.3 As the Principal Investigator, I will ensure that this project will follow the Western Biosafety Guidelines and Procedures Manual for Containment Level 1 & 2 Laboratories (and the Level 3 Facilities Manual for Level 3 projects). I will ensure that UWO faculty, staff and students working in my laboratory have an up-to-date Hazard Communication Form, found at <http://www.shs.uwo.ca/workplace/workplacehealth.html>

**An X in the check box indicates you agree with the above statement...**

**Enter Your Name** Aiming Wang **Date:** Feb. 28, 2012



15.4 Additional Comments: n/a

**16.0 Approvals**

1) UWO Biohazards Subcommittee: SIGNATURE: \_\_\_\_\_  
Date: \_\_\_\_\_

2) Safety Officer for the University of Western Ontario SIGNATURE: \_\_\_\_\_  
Date: \_\_\_\_\_

3) Safety Officer for Institution where experiments will take place (if not UWO):   
SIGNATURE: \_\_\_\_\_  
Date: 27-Feb-2012

Approval Number: \_\_\_\_\_ Expiry Date (3 years from Approval): \_\_\_\_\_

Special Conditions of Approval:

## Distribution of Soybean Viruses in Ontario

### Purpose:

Soybean viruses, especially Bean Pod Mottle Virus (BPMV) and Soybean Mosaic Virus (SMV) have caused significant losses to producers and the soybean industry in North America by reducing seed weight and quality. Food grade soybeans are most affected, due to seed coat blemishing or discolourization.

In Ontario, soybean viruses often go undetected or are misdiagnosed for other causes. The cost and time associated with submitting samples for laboratory analysis also limits producer and industry participation. A soybean virus distribution survey was initiated by AAFC and OMAFRA to increase awareness amongst producers and the soybean industry of the extent of virus infection in Ontario.

### Methods:

All soybean producing regions of Ontario were sampled for Soybean Mosaic Virus (SMV), Bean Pod Mottle Virus (BPMV), Tobacco Ringspot Virus (TRSV) and Alfalfa Mosaic Virus (AMV) in 2002 and 2003. A composite sample of young leaf tissue was obtained from 35 plants in each field. Over four hundred field sites were processed and virus testing was conducted through ELISA.

### Results:

1. **Previous Surveys:** An initial survey in 2001 detected BPMV for the first time in Ontario and Canada. A follow-up survey found that soybean virus levels increased in 2002 (Table 1).
2. **2003 Survey:** Of the over 300 commercial fields tested, 17 were found infected with AMV, 16 with BPMV, 15 with SMV and 19 with TRSV. The number of commercial fields infected were higher than the previous year with the exception of BPMV. However 16 commercial fields that tested negative for BPMV were resampled a month later due to the high incidence of insects, especially bean leaf beetles, and 11 of these fields were found positive (69% increase) for BPMV. This suggests that the time of sampling is very important and could impact future management strategies.

**Table 1- Virus Survey Results for 2002 and 2003**

Virus	Number of Positive Fields	
	2002	2003
TRSV	16	19
SMV	13	15
BPMV	20	16
AMV	15	17

### Summary:

Ontario Soybean fields were monitored for the presence and spread of the following soybean viruses: Alpha Mosaic Virus (AMV), Bean Pod Mottle Virus (BPMV), Soybean Mosaic Virus (SMV), and Tobacco Ringspot Virus (TRSV). All these viruses were found to be present in Ontario. From the surveys conducted to date the relative frequencies of these viruses are increasing in commercial fields. Possible explanations for this

increase include seed-borne infection and the increase in insect vectors such as the soybean aphid and bean leaf beetle. These viruses are dependent on insects vectoring for movement and infection of the plant.

In addition to determining the distribution and frequency of these viruses, the survey increased awareness amongst producers, ag-business and soybean breeders concerning the significance of these viruses.

**Next Steps:**

Future virus surveys will need to be conducted to assess the spread and extent of soybean viruses in Ontario. Continued education on soybean viruses and the spread of these viruses will be important to minimize their impact to the Ontario soybean industry.

**Acknowledgements:**

Ontario Soybean Growers, Agriculture and Agri-Food Canada (Roberto Michelutti), OMAFRA (Albert Tenuta, Tracey Baute), Agriculture Adaptation Council, and the Canada-Ontario Research Development Program.

**Project Contacts:**

For further information on this project please contact Albert Tenuta, OMAFRA Field Crops Pathologist at [albert.tenuta@ontario.ca](mailto:albert.tenuta@ontario.ca).

**Location of Project Final Report:**

Contact Albert Tenuta, OMAFRA Field Crops Pathologist at [albert.tenuta@ontario.ca](mailto:albert.tenuta@ontario.ca).

