Parthenium weed in Pakistan: knowledge sharing workshop

Julien Godwin, Abdul Rehman, Arne Witt

May 2017

KNOWLEDGE FOR LIFE

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Photo front cover: parthenium in Pakistan Dr Asad Shabbir

Photo below: stakeholders' workshop Islamabad May 2017

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The Executive Director of the Inspectorate General of Forests and representatives from various quarantine departments, research institutes (including National Agricultural Research Centre and Natural History Museum of Pakistan), universities and the FAO were invited to discuss and contribute towards a national response to the invasive weed *Parthenium hysterophorus*.

The workshop (participant list in Annex 1) was organised by CABI and sponsored by the UK's Department for International Development (DFID). CABI's new invasive species programme, dedicated to develop regional, national and local coordinated approaches to invasive species, delivered various background materials. The workshop's objectives were to share experiences and information on parthenium weed's presence and impacts in the country, and draft an initial comprehensive action plan in the short, medium and long term. It is worth noting that parthenium weed was chosen as a proof of concept: the invasive species programme will aim to consult with all stakeholder to asses which other invasive species should be included in the future as the programme develops.

The Executive Director of the Inspectorate General, Syed Mahmood Nasir from the Global Change Impact Studies and the workshop facilitator, Abdul Rehman of CABI Pakistan, urged the participants to be motivated and creative in their efforts to develop a well-coordinated approach plan that takes into account the latest research and the needs of communities that are or will be affected by this devastating invasive weed. Dr Arne Witt of CABI presented parthenium research and development activities from a global perspective.

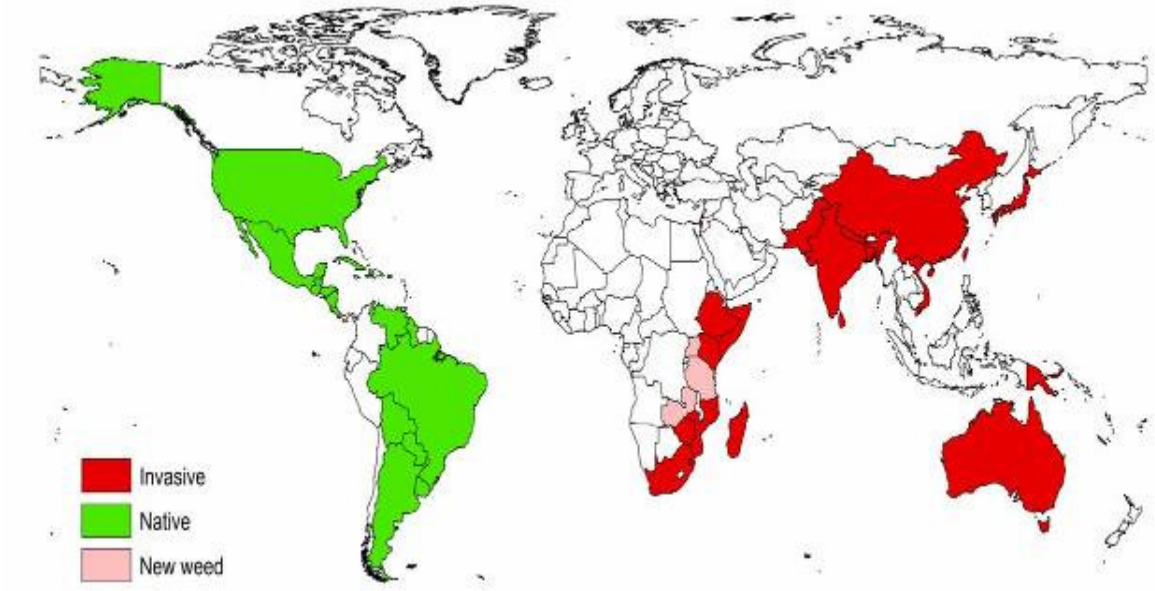

Figure 1: Summary of invasiveness of parthenium globally (Dr Asad Shabbir – University of Punjab)

Parthenium weed is currently invasive in many countries around the world (Figure 1) including countries in South Asia where, based on an eco-climatic model, many areas which are currently uninvaded are a good climatic match for this noxious weed (Figure 2). The weed disrupts the ecology of grasslands, and invades woodlands through aggressive competition and allelopathy (inhibiting growth of other plants). It also poses serious health hazards to livestock, and can cause severe allergenic reactions in people who regularly come into contact with the weed. It also reduces crop yield: for example, sorghum yields

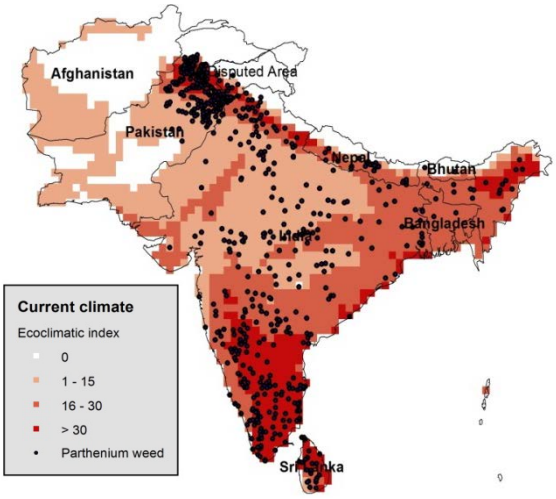

Figure 2: Localities in South Asia where parthenium weed is already present (closed circles) and areas which are a good eco-climatic match for this species (*Dr Asad Shabbir – University of Punjab*)

were reduced by 97% in experimental fields in Ethiopia, whilst in India, parthenium infestations have resulted in yield losses of up to 40% in several crops. Around the world, parthenium is considered a serious weed. It has been named the suicide weed in India, and up to 90% of the farmers in the lowlands of Ethiopia consider this weed to be the most serious weed of croplands and grazing areas. Parthenium is also a secondary host for a range of crop pests. In terms of pasture production, this noxious weed has been found to reduce livestock carrying capacities by as much as 90% (Jayachandra, 1971).

Pakistan is predicted to be extensively hit, as explained by Dr Asad Shabbir, assistant professor in the department of Botany at the University of Punjab.

The workshop revealed the main barriers that were preventing a national response to parthenium:

- There is a lack of coordination between research groups to investigate environmental, agricultural, human health and socio-economic impacts. This translates into a lack of collaboration and duplication of effort, wasting valuable resources.
- There is no clear communication strategy developed to raise awareness of parthenium's multisectoral impacts. As a result, whilst parthenium has significant impacts, they largely go un-noticed.

To develop a comprehensive national action plan, participants were divided into three groups. These groups attempted to list key activities and institutions involved in their development, as well as suggest timelines, budgets needed and associated monitoring and evaluation activities. A full version of the action plan can be found in Annex 2.

- The first group concentrated on research needs to fully understand parthenium's environmental, human and economic health impacts, as well as focus on Integrated Pest Management (IPM) best practices regarding prevention and detection, plus prevention-related control options.
- The second group focused on the communication required to reach urban and rural populations as well as key decision makers and practitioners in the environmental, agricultural, human health, and private sectors (particularly the floral industry).
- The third group focused on policy questions: what simple and effective measures can be developed and implemented to reduce the spread of parthenium weed through changes in policy and amendments to existing regulations? What processes are in place for the importation of host-specific biological control agents as part of a wider biological control strategy, and for the registration of safe and effective chemicals to control parthenium?

The action plan listed key actions to develop collaboratively, grouped into short, medium and long term goals. Short term goals will focus exclusively on gathering evidence to generate awareness among key stakeholders, and to provide comprehensive IPM related activities to prevent, detect and control parthenium. Medium term goals will involve in-depth

communication activities, such as the use of mobile apps to mass extension campaigns; initiation of activities to import host specific and damaging biological control agents; and register appropriate chemical herbicides for parthenium control. Finally, long term goals will focus on the development of appropriate national amendments to existing legislation.

Short term actions (6 months)

- Gather evidence of parthenium's socio-economic impacts from a gender perspective
- Gather evidence of parthenium's human health impacts in Pakistan
- Understand parthenium's pathways of spread and establishment across the country
- Research crop yield changes in relation to parthenium infestations with and without natural enemies (Zygogramma bicolorata trial)
- Understand stakeholder perceptions of biological control of invasive plants
- Investigate florists' use of parthenium and the market processes behind it
- Understand chemical control registration processes for parthenium weed in Pakistan
- Develop Weed Management Decision Guide (WMDG) for parthenium in Pakistan
- Develop and initiate communication strategy to generate awareness of parthenium at different levels and detect its presence across the country
- Initiate development of risk assessment documents for the import of further biological control agents for research trials
- Develop containment strategy through official guidelines and protocols to prevent spread from a domestic quarantine aspect

Medium term actions (6-18 months)

- Instigate discussions about registration of safe and effective herbicides with chemical industry
- Develop in-depth communication tools to produce two-way information system for collecting data on parthenium spread as well as delivery of management advice (citizen science, app development, mass extension)
- Initiate in-depth review of Pakistan's Animal and Plant Quarantine Acts to understand what needs to be amended
- Discuss with appropriate parties the process needed to amend acts from legislation and policy side
- Develop protocols to mass rear and investigate effect of multiple biological control agents on parthenium control
- Investigate change in floral industry actions on use of parthenium, and resulting impacts
- Instigate process for legislative and policy amendments as well as voluntary industry sector standards / agreements

Long term actions (18 months onwards)

- Develop mass rearing facility for two biological control agents for parthenium with public and private sector
- Implement large scale release of biological control agents in affected areas of parthenium
- Investigate effect of multiple biological control agents on parthenium control
- Continue process for legislative and policy amendments
- Develop case studies and other communication materials for various stakeholders to disseminate lessons learnt

Annex 1: Participant list

No	Name	Designation	Phone & Email
1	Mr. Goher Mushtaq	Divisional Forest Officer, Rawalpindi Forest, Wildlife & Fisheries Department, Punjab	Mobile:+92 (0) 315-5110788 Email: Mushtaq_goher@yahoo.com
2	Mr. Kamaran Babar	Divisional Forest Officer, Guzara Forest Rawalpindi. Forest, Wildlife & Fisheries Department, Punjab	
3	Mr. Syed Mahmood Nasir	Inspector General of Forests / Executive Director (Additional Charge) Global Change Impact Studies Centre, Islamabad.	Phone: +92 51 9245589 Mobile:+92 (0) 3075743450 Email: igf.moenv@gmail.com
4	Mr. Baitullah Khan	Area Manager Gujrat, Pakistan Tobacco Company	Mobile:+92 (0) 3008509779 Email: bait_ullah_khan@bat.com baitullaharifi@gmail.com
5	Mr. Zaigham Abbas Baloch	Deputy Director (Pollution Control), Pak-Environmental Protection Agency, Islamabad.	Phone: +92 51 9250511 Email: zaighambaloch@hotmail.com
6	Dr. Sumaira Sahreen	Associate Curator, Botanical Science Division, Pakistan Museum of Natural History. Garden Avenue, Shakarparian, Islamabad	Phone: +92 51 9249247 Mobile:+92 (0) 3009129039 Email: sumairasahreen@gmail.com
7	Dr Syed Aneel Ahmed Gilani	Associate Curator, Botanical Science Division, Pakistan Museum of Natural History. Garden Avenue, Shakarparian, Islamabad	Mobile:+92 (0) 3215850175 Email: aneelgilani@gmail.com
8	Dr. Ehsan ul Haq	Programme Leader/Principal Scientific Officer, Insect Pest Management Programme, Department of Plant & Environmental Protection, National Agriculture Research Center, Islamabad.	Phone: +92 51 9255219 Mobile:+92 (0) 3025100119 Email: Insectary@gmail.com
9	Ms. Mahrine Rashid	Sr. Scientific Officer, Herbarium, National Agriculture Research Center, Park Road, Islamabad.	Mobile:+92 (0) 30051547862 Email: mahrine.rashid@gmail.com
10	Ms. Huma Nazir Kayani	Entomologist (Quarantine), Department of Plant Protection, Islamabad	Mobile:+92 (0) 3365454716 Email: Huma_kayani43@yahoo.com
11	Dr. Asad Shabbir	Assistant Professor, Department of Botany, University of the Punjab, Q. A. Campus, Lahore	Mobile:+92 (0) 3055406464 Email: asad.iags@pu.edu.pk
12	Prof. Dr. Abdul Khaliq	Professor, Department of Agronomy, University of Agriculture, Agriculture University Road, Faisalabad	Phone: +92 41 9200161-2931 Mobile:+92 (0) 321-6615848 Email: khaliquaf@gmail.com
13	Dr. Asma Jabeen	Assistant Professor Department of Environmental Sciences, Fatima Jinnah Women University, Rawalpindi	Phone: +92 51 9270057-203 Mobile:+92 (0) 3025010741 Email: asma_jee@yahoo.com
14	Ms. Mehwish Jamil Noor	Lecturer, Department of Environmental Sciences, Fatima Jinnah Women	Mobile:+92 (0) 3335313960

		University, Rawalpindi	Email: mehwish_jn@yahoo.com
15	Dr. Faiz Ul Bari	NRM Advisor, FAO, Pakistan	Phone: +92 51 9255491 Mobile:+92 (0) 3458544116 Email: faizul.bari@fao.org
16	Mr. Shahbaz Tufail	Research Intern, Sustainable Development Policy Institute, Islamabad	Phone: +92 51 2278134 Email: shahbaztufail@sdpi.org
17	Ms. Amber Khan	Research Assistant, Department of Environmental Sciences, Fatima Jinnah Women University, Rawalpindi	
18	Ms. Hafsa Bashir	Research Assistant, Department of Environmental Sciences, Fatima Jinnah Women University, Rawalpindi	
19	Mr. Saad Ahmad Khan	Research Intern, CABI CWA, Rawalpindi	Mobile:+92 (0) 3468118546 kashankhan700@gmail.com
20	Mr. Muhammad Hamza Khan	Research Intern, CABI CWA, Rawalpindi	Mobile:+92 (0) 3328376790 Email: khanhamza20@gmail.com
21	Ms. Ayesha Riaz	Technician, CABI CWA, Rawalpindi	Mobile: +92 331 5110687 Email: a.riaz@cabi.org
22	Mr. Riaz Mahmood	Insect Bio control Specialist, CABI Rawalpindi	Mobile:+92 (0) 3365133680 Email: r.mahmood@cabi.org
23	Dr. Aamir Humayun Malik	Deputy Director Programme, CABI CWA, Rawalpindi	Mobile:+92 (0) 3365133690 Email: a.malik@cabi.org
24	Dr. Babar E. Bajwa	Regional Director, CABI CWA, Rawalpindi	Mobile:+92 (0) 336513381 Email: b.bajwa@cabi.org
25	Mr. Abdul Rehman	Coordinator IAS, CABI CWA, Rawalpindi	Mobile:+92 (0) 3365133673 Email: a.rehman@cabi.org
26	Mr. Irshad Ali	Regional M&E and Programme Support Officer, Asia CABI	Mobile:+92 (0) 3315171138 Email: a.rehman@cabi.org
27	Dr. Julien L. Godwin	Programme support manager - Invasives programme, CABI	Email: j.godwin@cabi.org
28	Dr. Arne Witt	Regional Coordinator - IAS, CABI	Email: a.witt@cabi.org
29	Dr. Abdillahi Alawy	Global Director, Monitoring & Evaluation, CABI	Email: a.alawy@cabi.org

Annex 2: Comprehensive action plan for management of Parthenium May 2017

COMPREHENSIVE ACTION PLAN FOR MANAGEMENT OF PARTHENIUM IN PAKISTAN - May 2017								
SHORT TERM ACTIVITIES								
#	**theme**	**activities**	**who is leading**	**who is involved**	**who already has plans/is doing something**	**timeline in months**	**monitoring activities**	**evaluating impacts**
1	baseline research	gather evidence on crop yield losses	masters' students	Abdul Rehman, Abdul Khaliq, Asad Shabbir, Arne Witt, Julien Godwin	University of Agriculture, Faisalabad; Punjab University Lahore	2 months	report of key findings disseminated to key stakeholders; research paper produced	baseline evidence for measuring change
2	baseline research	gather evidence on human health impact of parthenium from a gender perspective	masters' students	Abdul Rehman, Abdul Khaliq, Asad Shabbir, Arne Witt, Julien Godwin	NIH - allergy centre contact Dr Anil	2 months	report of key findings disseminated to key stakeholders; research paper produced	baseline evidence for measuring change
3	baseline research	gather evidence of dispersal pathways of parthenium, Pakistan	masters' students	Abdul Rehman, Abdul Khaliq, Asad Shabbir, Arne Witt, Julien Godwin	University of Agriculture, Faisalabad; Punjab University Lahore	2 months	report of key findings disseminated to key stakeholders; research paper produced	baseline evidence for measuring change
4	baseline research	gather evidence on zygogramma effects on parthenium	masters' students	Abdul Rehman, Abdul Khaliq, Asad Shabbir, Arne Witt, Julien Godwin	University of Agriculture, Faisalabad; Punjab University Lahore	2 months	report of key findings disseminated to key stakeholders; research paper produced	baseline evidence for measuring change

5	baseline research	gather evidence of socio-economic losses	masters' students	Abdul Rehman, Abdul Khaliq, Asad Shabbir, Arne Witt, Julien Godwin	University of Agriculture, Peshawar (Haroon Khan has already published paper on socio economic survey)	2 months	report of key findings disseminated to key stakeholders; research paper produced	baseline evidence for measuring change
6	investigative research	effect of zygogramma on crop yields	masters' students	Abdul Rehman, Abdul Khaliq, Asad Shabbir, Arne Witt, Julien Godwin	University of Agriculture, Faisalabad; Punjab University Lahore	6 months	report of key findings disseminated to key stakeholders; research paper produced	research supporting policy decision for large scale release of biocontrol agent
7	investigative research	impact of parthenium on crop yield losses	masters' students	Abdul Rehman, Abdul Khaliq, Asad Shabbir, Arne Witt, Julien Godwin	University of Agriculture, Faisalabad; Punjab University Lahore	6 months	report of key findings disseminated to key stakeholders; research paper produced	baseline evidence for measuring change
8	investigative research	attitudes of stakeholders towards biological control from a gender perspective	Abdul Rehman	Abdul Khaliq, Asad Shabbir, Arne Witt, Julien Godwin	none	6 months	report /research paper produced	baseline evidence for measuring change
9	investigative research	floral industry use of parthenium: market research and perception study (consumers/florists/wholesalers)	masters' students	Abdul Rehman, Abdul Khaliq, Asad Shabbir, Arne Witt, Julien Godwin	none	6 months	report of key findings disseminated to key stakeholders; research paper produced	baseline evidence for measuring change
10	investigative research	understand herbicide registration process and state of chemical control for parthenium	Abdul Rehman	Julien Godwin, Arne Witt	none	2 months	status report	registration process allows new chemicals to be used on parthenium

11	investigative research	understand biological control import process for an invasive weed	Abdul Rehman	Arne Witt	CABI	2 months	status report	import permit allows BCA to be imported
12	development	develop Weed Management Decision Guide (WMDG) utilising best practices for prevention, early detection and monitoring, and control	Julien Godwin	Abdul Khaliq, Asad Shabbir, Arne Witt, Abdul Rehman	CABI, Plantwise	2 months	final document produced	different uses and number of times viewed/utilised
13	development	develop risk assessment for the import of further biological control agents for research trials	Arne Witt Abdul Rehman	Abdul Khaliq, Asad Shabbir, Julien Godwin	none	4 months	final document produced	import permit allows BCA to be imported
14	development	develop list of official domestic quarantine guidelines / protocols to prevent spread of weed	Arne Witt Abdul Rehman	Abdul Khaliq, Asad Shabbir, Julien Godwin	none	3 months	final document produced	guidelines get taken up in official capacity (legislative/policy)
15	development	instigate discussions about registration of safe and effective chemicals with chemical industry	Abdul Rehman,	Abdul Khaliq, Asad Shabbir, Arne Witt, Julien Godwin	none	6 months	research report; meetings with chemical industry and pesticide control board	registration process allows new chemicals to be used on parthenium
16	communication	design mass extension campaign utilising various tools	Julien Godwin	Abdul Rehman, Arne Witt	CABI, Plantwise	2 months	communication strategy developed	change of public perception of parthenium and biological control; change in knowledge of how to control parthenium

17	communication	advocacy for policy makers	Julien Godwin	Abdul Rehman, Syed Mahmood Nasir, Marketing and comms team CABI, Arne Witt, Asad Shabbir, Abdul Khaliq	CABI, Plantwise	2 months	one on one meetings; workshop report disseminated; pamphlets designed	advocacy sways opinion towards the importance of parthenium
	MEDIUM TERM ACTIVITIES							
18	research	initiate in-depth review of Pakistan's Animal and Plant Quarantine Acts	Abdul Rehman	Julien Godwin, support from legal experts	none	9 months	report on acts	change in domestic quarantine legislation
19	research	investigate change in floral industry actions on use of parthenium, and resulting impacts	Abdul Rehman	Arne Witt, Julien Godwin	none	18 months	data obtained, report and research paper produced	change of florists' behaviour
20	research	understand possible use of citizen science approach for information system	Abdul Rehman	Gareth Richards, Julien Godwin	none	9 months	report on citizen science possibilities	change in numbers of report of presence of parthenium
21	communication	run mass extension campaign	Abdul Rehman	Arne Witt, Marketing and Comms team CABI, Plantwise Pakistan, Julien Godwin, Scidev.net	none	7 months	number of tools used, number of people reached	change in behaviour/knowledge of parthenium
22	communication	focus awareness strategy on florists	Abdul Rehman	Arne Witt, Julien Godwin	none	9 months	awareness material produced; number of meetings with florists	change of florists' behaviour
23	communication	design app for data collection of parthenium with agricultural extension	Abdul Rehman	Plantwise Knowledge Bank, IT development, Julien Godwin	none	18 months	app developed and integrated to ag extension phones	change in numbers of report of presence of parthenium
24	development	continue negotiations of import of BCA based on risk assessment	Abdul Rehman	Abdul Khaliq, Asad Shabbir, Arne Witt, Julien Godwin	none	9 months	final document produced	import permit allows BCA to be imported

25	development	instigate process to make legislative and policy amendments regarding domestic quarantine guidelines for parthenium	Abdul Rehman	Julien Godwin, support from legal experts	none	15 months	meetings with officials and policy makers; report to suggest way forward	change in domestic quarantine legislation
26	development	design protocols to mass rear two BCA in Pakistan	Abdul Rehman	Abdul Khaliq, Asad Shabbir, Arne Witt, Julien Godwin, Eshan Ul Haq	none	9 months	protocol designed and finalised	change in impact of parthenium
	LONG TERM ACTIVITIES							
27	development	build mass rearing facility for two biological control agents for parthenium with public and private sector	Abdul Rehman	Abdul Khaliq, Asad Shabbir, Arne Witt, Julien Godwin, Eshan Ul Haq	none	24 months	facilities built	change in impact of parthenium
28	development	implement large scale release of biological control agents in affected areas of parthenium	Abdul Rehman	Arne Witt, Asad Shabbir, Abdul Khaliq, possible student work, Eshan Ul Haq	none	36 months	number of BCA reared and released; number of media reports	change in impact of parthenium
29	investigative research	investigate effect of multiple biological control agents on parthenium control	Abdul Rehman	Arne Witt, Asad Shabbir, Abdul Khaliq, possible student work	none	42 months	report / research paper published	change in impact of parthenium
30	development	continue process for legislative and policy amendments	Abdul Rehman	Julien Godwin, support from legal experts	none	24 months	updates on number of meetings and status update	change in domestic quarantine legislation

Africa

Ghana

CABI, CSIR Campus
No.6 Agostino Neto Road
Airport Residential Area
P.O. Box CT 8630,
Cantonments
Accra, Ghana
T: +233 (0)302 797 202
E:westafrica@cabi.org

Kenya

CABI, Canary Bird
673 Limuru Road,
Muthaiga
P.O. Box 633-00621
Nairobi, Kenya
T: +254 (0)20 2271000/20
E:africa@cabi.org

Zambia

CABI, Southern Africa
Centre
5834 Mwange Close
Kalundu, P.O. Box 37589
Lusaka, Zambia
T: +260967619665
E: southernafrica@cabi.org

Americas

Brazil

CABI, UNESP-Fazenda
Experimental Lageado,
FEPAF (Escritorio da CABI)
Rua Dr. Jose Barbosa De
Barros 1780
Fazenda Experimental
Lageado
CEP: 18.610-307
Botucatu, San Paulo, Brazil
T: +55 (14) 3880 7670
E: y.colmenarez@cabi.org

Trinidad & Tobago

CABI, Gordon Street,
Curepe
Trinidad & Tobago
T: +1 868 6457628
E: caribbeanla@cabi.org

USA

CABI, 745 Atlantic Avenue
8th Floor
Boston, MA 02111
T: +1 (617) 682-9015/ +1
(617) 682-9016
E: h.jansen@cabi.org

Asia

China

CABI, Beijing
Representative
Office
Internal Post Box 85
Chinese Academy of
Agricultural Sciences
12 Zhongguancun Nandajie
Beijing 100081, China
T: +86 (0)10 82105692
E: china@cabi.org

India

CABI, 2nd Floor, CG Block,
NASC Complex, DP Shastri
Marg
Opp. Todapur Village,
PUSA
New Dehli – 110012, India
T: +91 (0)11 25841906
E: india@cabi.org

Malaysia

CABI, PO Box 210
43400 UPM Serdang
Selangor, Malaysia
T: +60(0)3 894329321
E: cabisea@cabi.org

Pakistan

CABI, Opposite 1-A,
Data Gunj Baksh Road
Satellite Town, PO Box 8
Rawalpindi-Pakistan
T: +92 51 929 2064/ 2063 /
2062
E: cabi.cwa@cabi.org

Europe

Switzerland

CABI, Rue des Grillons 1
CH-2800 Delemont
Switzerland
T: +41 (0)32 4214870
E: europe-ch@cabi.org

Head Office

CABI, Nosworthy Way
Wallingford, Oxfordshire
OX10 8DE, UK
T:+44 (0)1491 832111
E: corporate@cabi.org

UK (Egham)

CABI, Bakeham Lane
Egham, Surrey
TW20 9TY, UK
T: +44 (0)1491 829080
E: microbialservices@cabi.org
E: cabieurope-uk@cabi.org