

A harmonious approach to eggplant borer control in India and Bangladesh

Key fact:

Affordable, environmentally-friendly pest management developed in India and Bangladesh to protect the region's popular eggplant crop has reduced dependence by poor farmers on harmful pesticides, increasing profits and influencing policy to benefit businesses and spread the message.

Summary:

Eggplant, one of the few affordable and nutritious vegetables available year-round in South Asia, is vulnerable to attack from the destructive eggplant fruit and shoot borer (EFSB). Integrated pest management (IPM) options were investigated by the World Vegetable Center with partner organisations in India and Bangladesh to reduce costly and intense use of hazardous pesticides by developing female moth-borne sex pheromone lures and traps to kill male borer moths. The technology has been combined with other pest management techniques, including healthy seedling production; prompt removal and destruction of infested shoots and fruits at regular intervals; and withholding of chemical pesticides to encourage natural enemies. As a result, pesticide use has dropped by up to 75 per cent, reducing production costs and increasing incomes. Commercialisation by small and medium enterprises in India, which advertised the affordable lures, has resulted in farmer uptake beyond the project area. Since 2009, Bangladesh's parliament has been in the process of passing a law to facilitate registration and use of sex pheromones for pest control.



Facts & figures¹

- ❖ South Asia accounts for almost half of the world's area under eggplant cultivation.
- ❖ Led by the World Vegetable Center, researchers developed IPM techniques to decrease pesticide application - some farmers spraying up to 84 times during a 6-7 month cropping season - to prevent losses to eggplant fruit and shoot borer.
- ❖ New IPM technology reduced pesticide use by up to 75% in Jessore and Norsingdi, Bangladesh and up to 53% in Birbhum district, West Bengal, India.
- ❖ IPM adopters increased income by 50-60% while production costs fell 30%.
- ❖ A total of 9,984 farmers were trained through the project in India and Bangladesh during farmer field days and demonstrations.
- ❖ Three extension brochures were published in six languages, including English, and nearly 22,000 copies of these brochures were distributed to farmers during field days, meetings, and training sessions.
- ❖ Promotion activities also included the screening of a documentary produced in six languages, including English. It was transmitted on Bangladesh national TV five times and 13 times on Indian national TV.
- ❖ By the end of 2005, nine small- and medium-sized enterprises in five Indian states (Andhra Pradesh, Gujarat, Madhya Pradesh, Maharashtra and Tamil Nadu) were selling IPM lures designed by the project. The total sale of pheromone lures by four small or medium enterprises almost tripled from 74,000 in 2002 to 193,000 in 2004.
- ❖ Besides better costs and returns, studies found that IPM adopters increased their production area by 21.6%, while non-adopters reduced production area by 8.7%.

A harmonious approach to eggplant borer control in India and Bangladesh

Eggplant is economically important in South Asia - the region accounts for almost half of the world's cultivation. Rich in vitamins and minerals, low in saturated fat, cholesterol, and sodium, eggplant is typically grown on small family plots for cash income.

Even during the hot, wet monsoon season when other vegetables are in short supply, eggplant is generally available to the rural and urban poor at affordable prices. But in recent years, its cultivation has become increasingly costly as a result of insect pest damage, in particular by the eggplant fruit and shoot borer (EFSB), and more hazardous because of the chemical pesticides used to control it.

Despite some pesticides being classified as extremely hazardous by the World Health Organization, and banned or severely restricted in most places, South Asian farmers have continued to use them in an attempt to control EFSB. Non-Hodgkin's lymphoma, leukaemia, neurological symptoms and skin diseases are all associated with prolonged exposure to the use of chemical pesticides.

Yet, with no alternative control measures to kill borer larvae before shoots and fruits are destroyed, farmers spray intensely, up to 84 times during a six-to-seven month cropping season. Such high pesticide use has led to borer resistance to pesticides, and contributed to reduced farmer profits, environmental pollution and eradication of EFSB's natural enemies. However, with support from the UK Department of International Development (DFID), an IPM strategy for smallscale farmers in India and Bangladesh was implemented, including development of borer-resistant eggplant cultivars, biological pest control using natural enemies, prompt removal and destruction of infested shoots and fruits at regular intervals, and sex pheromone traps.



Farmers set up a pheromone lure to protect against EFSB (*World Vegetable Center*)

Baited with the female borer sex pheromone, the traps attract and kill adult males. Research efforts were targeted at reducing the cost of pheromone lures and traps by using local materials. The sex pheromone is the only input that needs to be purchased. Other IPM techniques were employed along with the use of the traps, including destroying the previous harvests' eggplant stalks to prevent insect survival from one season to the next, prompt disposal of borer-damaged shoots and fruits, and restricted insecticide use to allow natural enemies to flourish.

Farmer-to-farmer demonstrations and field days promoted the use of the pheromone traps, encouraging meetings between farmers and researchers and showing neighbours and relatives that adopting IPM instead of routinely using pesticides successfully reduces borer damage.

Almost 10,000 farmers across the two countries were trained in IPM techniques, including how and when to assemble traps in fields, how to maintain them and how often to change the lures. Distribution of brochures, leaflets and posters, as well as radio and television interviews helped to spread the message, and a video documentary was also screened in local languages.

At the start of the project in April 2000, sex pheromones were not commercially available. However, the successful uptake of lures prompted enterprises in India to commercialise the sex pheromone and sell it at competitive prices. By late 2005, nine small- and medium-sized Indian enterprises were selling the pheromone lures - several of them almost tripling sales between 2002 and 2004.

In the Jessore and Norsingdi areas of Bangladesh and in Birbhum district, West Bengal, India, the IPM approach has reduced pesticide use by up to 75 per cent amongst participating farmers, cutting production costs by 30 per cent and increasing incomes by as much as 60 per cent. In addition, yields have been boosted by up to 56 per cent in some areas. Indirect benefits include lower health hazards and environmental degradation.

Almost all eggplant growers adopting IPM have continued the practices and, due to commercialisation of the lures, they have been adopted beyond initial project target areas. Department of Agricultural Extension officials have been amongst those trained to advise farmers in IPM practices to provide further impact beyond the lifetime of the project. And, since 2009, Bangladesh's parliament has been in the process of passing a law to facilitate registration and use of sex pheromone for pest control.



Adopting the IPM approach in eggplant has enabled farmers to cut down on pesticide use and increase their incomes
(WRENmedia)

Testimonials:

- **Dr. K. P. Jayanth, Vice President, Bio-Control Research Laboratories, Bangalore, India:**
“We are getting regular and sustained demand from farmers for the lures and traps. Farmers' education and continuous extension activities are a must to create awareness on IPM in general and Leucin lures and traps in particular.”

Additional case study information

Costs and benefits:²

South Asia accounts for almost 50 per cent of the world's area under eggplant cultivation. The vegetable is economically important for the many smallscale farmers who cultivate it for cash income. Pesticides typically amount to 30-50 per cent of the total cost of eggplant production in the region. However, this new IPM technology has reduced pesticide use by up to 75 per cent in Jessore and Norsingdi areas of Bangladesh and up to 53 per cent in Birbhum district, West Bengal, India, leading to a 30 per cent reduction in production costs while increasing participating farmers' net income by 50-60 per cent. In addition, the popularity of lure and trap technology has attracted small- and medium-sized enterprises to commercialise the pheromone lures. Among them, four small or medium enterprises almost tripled production from 74,000 lures in 2002 to 193,000 in 2004, reaping significant economic benefits.

DFID contribution to research:

- Between April 2000 and January 2006, research to develop and promote a successful IPM strategy and accompanying technology, under two phases, was funded by DFID, which provided just over £500,000 in financial support.
- The DFID-funded research enabled the World Vegetable Center to work with Natural Resources Institute, United Kingdom, and the local partner organisations across India and Bangladesh.

- The sustainable integrated pest management (IPM) technology identified was developed and validated, with subsequent pilot projects launched as a result of DFID funding.
- Successful project results led to technology promotion in India and Bangladesh, also funded by DFID.
- Partnerships fostered as a result of this research led to the uptake of new technologies by the private sector, promoting and sustaining IPM techniques beyond the directly targeted areas.

Research milestones:

- 2000 An IPM strategy is investigated and baseline surveys of eggplant production and protection are carried out in India and Bangladesh.
- 2003 Sustainable integrated pest management (IPM) technology is developed for eggplant and tested on farmers' fields through demonstrations in Bangladesh, India and Sri Lanka in the early stages. Promotion attracts media attention and enterprises begin manufacturing and selling pheromone lures.
- 2004 Farmer field days continue demonstrating the benefits felt by farmers through practising IPM techniques, attracting press and decision makers.
- 2005 A socio-economic study of farmers' eggplant production and protection practices and an assessment of the impact of the project activities yields positive results.
- 2006 With Department of Agricultural Extension and other officials trained in IPM practices to take over training of farmers, the project ends.
- 2006-2009 Bangladesh Agricultural Research Institute continues the promotion of eggplant IPM strategy with the support of Bangladesh Government and other donor agencies.
- 2006-2010 World Vegetable Center expands the promotion of eggplant IPM strategy in India with the support of other donor agencies.
- 2008 Bangladesh Agricultural Research Institute and the World Vegetable Center are awarded the Ryutaro Hashimoto APFED Award for Good Practices by Asia-Pacific Forum for Environment and Development (APFED) for implementing eggplant IPM.
- 2009 At the 6th International IPM Symposium held on 24th March, 2009 in Portland, Oregon, USA, the International Team for Sustainable Adoption of Eggplant IPM in South Asia was presented with an International Award of Recognition.

Photo credits:

World Vegetable Center: For high res images contact Maureen Mecozzi (Maureen.mecozzi@worldveg.org)

WRENmedia: For high res images contact Susanna Thorp (s.thorp@wrenmedia.co.uk)

Links:

The World Vegetable Center: www.avrdc.org

Main references:

Alam, S.N., M.I. Hossain, F.M.A. Rouf, R.C. Jhala, M.G. Patel, L.K.Rath, A. Sengupta, K. Baral, A.N. Shylesha, S. Satpathy, T.M. Shivalingaswamy, A. Cork and N.S. Talekar, (2006) *Implementation and promotion of an IPM strategy for control of eggplant fruit and shoot borer in South Asia*, AVRDC Technical Bulletin No. 36. http://www.avrdc.org/publications/technical_bulletin/TB36.pdf

Baral, K., B.C. Roy, K.M.B. Rahim, H. Chatterjee, P. Mondal, D. Mondal, D. Ghosh, and N.S. Talekar, (2006) *Socio-economic Parameters of Pesticide Use and Assessment of Impact of an IPM Strategy for the Control of Eggplant Fruit and Shoot Borer in West Bengal, India*, AVRDC Technical Bulletin No. 37.

http://www.avrdc.org/publications/technical_bulletin/TB37.pdf

Contact for further information:

Srinivasan Ramasamy

The World Vegetable Center

P.O. Box 42

Shanhua

Tainan 74199

Taiwan

Email: info@worldveg.org or srini.ramasamy@worldveg.org

¹ Facts and figures sourced from: Alam, S.N., M.I. Hossain, F.M.A. Rouf, R.C. Jhala, M.G. Patel, L.K.Rath, A. Sengupta, K. Baral, A.N. Shylesha, S. Satpathy, T.M. Shivalingaswamy, A. Cork and N.S. Talekar, (2006) *Implementation and promotion of an IPM strategy for control of eggplant fruit and shoot borer in South Asia*, AVRDC Technical Bulletin No. 36

² Alam, S.N., M.I. Hossain, F.M.A. Rouf, R.C. Jhala, M.G. Patel, L.K.Rath, A. Sengupta, K. Baral, A.N. Shylesha, S. Satpathy, T.M. Shivalingaswamy, A. Cork and N.S. Talekar, (2006) *Implementation and promotion of an IPM strategy for control of eggplant fruit and shoot borer in South Asia*, AVRDC Technical Bulletin No. 36



DFID, the Department of International Development, is the part of the UK government that manages Britain's aid to poor countries and works to get rid of extreme poverty.



This case study has been commissioned by DFID and produced by WRENmedia, as part of a series demonstrating the impact of DFID's funding to agricultural research. The views expressed do not necessarily reflect the Department's official policies.

© Crown copyright 2010

Copyright in the typographical arrangement and design rests with the Crown. The materials contained within this case study (excluding the logos and photos) may be reproduced free of charge in any format provided that it is reproduced accurately and not used in a misleading context. The material must be acknowledged as Crown copyright with the title and source of the publication specified.