PAN Germany
Pestizid Aktions-Netzwerk e.V.

PAN Pesticide Action Network International

Phasing in Alternatives to Endosulfan

Reasons, experiences and links

Pesticides worth more than US$30 billion are intentionally released into the global environment every year. Many of these are highly toxic and have immediate adverse effects on human health and wildlife or contaminate local food, water, soil and air. Others have chronic effects, including cancers, reproductive problems, birth defects, hormonal disruption and damage to the immune system. Harm may result from direct exposure during handling, spray drift, washing contaminated work clothes, storing pesticides in the home, or indirectly via pesticide dumps and persistence in the environment. One of these highly problematic pesticides is the insecticide endosulfan.

Joint Paper of the PAN International working group Alternatives to Synthetic Pesticides

Prepared by Susan Haffmans, PAN Germany, in cooperation with:
Fernando Bejarano, RAPAM (Mexico), S. Davo Vodouhe, OBEPAB (Benin)
Meriel Watts, PANAP (New Zealand), Carina Weber, PAN Germany
Stephanie Williamson, PAN UK

PAN Germany for PAN International, Hamburg, October 2008

Phasing out Endosulfan
Phasing in Alternatives

Endosulfan causes harm all over the world. It is very dangerous for humans and for the environment. It is harmful in contact with skin, very toxic by inhalation and if swallowed[1]. In March 2007, the Chemical Review Committee of the Rotterdam Convention on the Prior Informed Consent Procedure (PIC Convention) recommended the inclusion of endosulfan in its Annex III. Annex III is the list of chemicals that have been banned or severely restricted for health or environmental reasons by Parties to the Convention. In July 2007 the Council of the European Union (EU) made the decision to propose endosulfan for listing in the Stockholm Convention on Persistent Organic Pollutants (POPs Convention) for global elimination. Pesticide Action Network (PAN) promotes the elimination of harmful pesticides and the generation, innovation and promotion of ecological alternatives to pesticides. PAN supports the inclusion of endosulfan in the PIC and POPs Conventions[2]. This leaflet provides information about existing alternatives to endosulfan use.

Endosulfan – negative impacts on health, wildlife and environment

Endosulfan is an organochlorine insecticide. It is used to control a wide range of sucking and chewing insects, including aphids, thrips, beetles, foliar feeding caterpillars, mites, borers, cutworms, bollworms, bugs, whiteflies, leafhoppers and tsetse flies and other invertebrates such as snails in rice paddies and earthworms in turf. It is applied on crops, on farm animals and pets, on sport fields and in other situations. It is widely considered to be a persistent organic pollutant (POP). It is volatile and has the potential for long-range atmospheric transport and therefore contaminates environments far from where it is used. It is stored in the fatty tissues of animals and humans, accumulating up the food chain, including in mothers' milk.

Residues of endosulfan have been found in indoor air, rain, in all kind of water resources and in sediment, soil, tree bark, aquatic plants, fish, crocodile eggs and other living things. Residues have also been found in food around the world, in dairy foods, meat, chicken, vegetable oil, peanuts, seeds, fruit, honey, rice and many different vegetables. As a hormone disruptor, endosulfan threatens reproductive capacity. Although endosulfan is not listed in the cancer listings of the US Environmental Protection Agency, EU or International Agency for Research on Cancer, studies have shown that endosulfan can increase the risk of breast cancer[3,4,5,6]. In some communities it has left a legacy of deformity and malfunction. Many cases of poisoning, including fatalities, have been reported from Benin, Colombia, Costa Rica, Cuba, Guatemala, India, Indonesia, Malaysia, Philippines, South Africa, Sri Lanka, Sudan, Turkey and the USA. Endosulfan is one of the main causes of acute poisoning in Central America, in southern India and other areas[7].

Crops on which endosulfan is applied

Endosulfan is used in banana, berry fruit, cabbage and other crucifers, cassava, citrus, coffee, corn, cotton and other fibre crops, cowpea, eggplant, forage crops, forest trees, garlic, lettuce, mango, mungbean, onion, ornamentals, peanut, pepper, pigeon pea, oil crops, ornamentals, potato, rice, sesame, sorghum, soybean, squash and other cucurbits, string bean, sweet potato, tea, tomato, and wheat production.

In some African countries endosulfan is widely used, especially in cotton cultivation. Blood samples from cotton farmers have shown detectable levels of endosulfan and the farmers are suffering from many symptoms of acute endosulfan poisoning. Some of the worst cases of poisoning were found in Benin, which included deaths of farmers or their family members exposed to endosulfan[8]. After almost 10 years of environmental damage, poisoning and deaths the government of Benin announced in February 2008 that the chemical would be banned after the existing stocks are used up.

Endosulfan Monograph

The Intergovernmental Forum on Chemical Safety identified endosulfan as an acutely toxic pesticide that poses significant health problems for developing countries and economies in transition. However, this statement of concern is no longer limited to developing countries, nor just to acute effects, nor just to humans. For more information: PANAP (2008): Endosulfan Monograph by Dr. Meriel Watts. http://panap.net/uploads/media/EndosulfanMonograph2008June.pdf

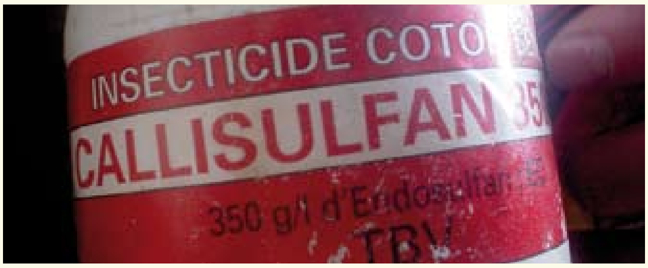

ENDOSULFAN

SUMMARY

PANAP

Bad practice: countries where endosulfan is still in use

A complete list of countries where endosulfan is currently in use does not exist. But according to PAN data endosulfan is still in use in the following countries: Australia, Bangladesh, Brazil, Cameroon, Canada, China, Ghana, Honduras, Iceland, Indonesia, India, Iran, Israel, Japan, Korea, Madagascar, Mexico, New Zealand, Pakistan, Panama, Philippines, Russia, South Africa, Tanzania, Thailand, Uganda and United States.



Growing crops without endosulfan - experiences and case studies

Growing crops without endosulfan is possible.

Many countries around the world show that crops can be grown without the use of endosulfan. Daily proof is provided by the following 55 countries where endosulfan is banned or strongly restricted or has been withdrawn: Austria, Bahrain, Belgium, Belize, Benin, Bulgaria, Burkina Faso, Cap-Vert, Cambodia, Chad, Colombia, Cote d'Ivoire, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Gambia, Germany, Greece, Guinea Bissau, Hungary, Ireland, Italy, Jordan, Kuwait, Latvia, Lithuania, Luxembourg, Malaysia, Malta, Mauritania, Mali, the Netherlands, Niger, Nigeria, Norway, Oman, Poland, Portugal, Qatar, Romania, Saudi Arabia, Senegal, Singapore, Slovakia, Slovenia, Spain, St Lucia, Sri Lanka, Sweden, Syria, the United Arab Emirates and the United Kingdom. Examples from Asia, Africa, Latin America and Europe of successful production without endosulfan give daily proof that practical alternatives to endosulfan exist and are technically and economically feasible.

Examples of no use of endosulfan around the world.

Source: S. Haffmans/PAN Germany, 30.09.2008, derived from Image: BlankMap-World-v5.png, Date: 2008-09-04, Author: Chanheigeorge

Growing crops without endosulfan - experiences from ASIA

India: The experience from India shows that growing organic cotton has not only a positive impact on the environment and on people's health but is also beneficial for the socio-economic situation of cotton farmers. While conventional cotton farmers use endosulfan to combat cotton bollworms and other pests, Indian organic farmers manage these with a non-chemical pest management system, based primarily on preventive measures. These include planting robust cotton varieties, maintaining a diverse crop rotation, intercropping with maize and pigeon peas as trap crops and with flowering plants like marigold and sunflowers to attract beneficial insects, and the use of 'Trichocards' containing eggs of the parasitic wasp Trichogramma. Trichogramma parasitizes the eggs of the bollworm moth, one of the key pests of cotton. In addition, Indian farmers prepare and apply repellents and botanical pesticides from plants that grow locally[9,10]. Detailed research in 2003 and 2004 in India demonstrated that organic cotton farming can be far more profitable than conventional farming, with gross margins about 30-52% higher than in conventional production. Revenues from organic cotton sales were about 30% higher than from conventional sales[11].

Sri Lanka: Following the ban of endosulfan in 1998, the yields of 13 specific vegetable crops and rice, and the number of incidents of pesticide poisoning, were examined for the period 1990–2003. While no drop in yields in paddy rice, cereals, pulses, tea, rubber, coconut or the vegetable crops had been measured, and no increase in the cost of production had been registered, the ban of endosulfan contributed to a large reduction in both fatal poisonings and suicide[12].

Growing crops without endosulfan - experiences from AFRICA

BENIN: Since 1996 a growing number of Benin cotton farmers have proven that cotton can be grown without endosulfan. Training in alternative pest management strategies, integrating indigenous techniques, and the use of plant extracts and trap crops enable the farmers to successfully grow cotton without pesticides[13]. There is now considerable experience in using a range of non-chemical strategies for pest management, including: encouraging natural predators; selection of resistant varieties; planting early maturing varieties which reduce the risk of pest attacks; use of rotation and trap crops; and the use of food sprays for predators to improve the balance between useful insects and pests. The use of food sprays has helped to manage caterpillar pests in general and Helicoverpa bollworm in particular, and has shown to be a useful tool to combat pests without using endosulfan. In Benin, the area under organic cotton grew from 500 hectares in 2003 to an estimated 1,800 hectares in 2008[14]. The production of seed cotton went up in the same period from 200 tonnes to more than 750 tonnes seed cotton and the number of organic cotton farmers rose from 500 in 2003 to 900 farmers in 2006/7[15]. The organic cotton experience has convinced many farmers in the cotton sector in Benin and conventional farmers are now copying some of the organic pest management techniques, even if they do not adopt the entire strategy.

Growing crops without endosulfan - experiences from LATIN AMERICA

Mexico: Though in Mexico endosulfan is still in use, more and more peasant farmers are growing coffee without endosulfan. They successfully control the main pest, the coffee berry borer beetle, through a combination of different non-chemical control methods: the use of a beneficial fungus, the use of wasps (Cephalonomia stephanoderis, Prorops nasuta and Phymastichus coffea) that are natural enemies to the coffee berry borer, through phytosanitary measures and the use of neem seed products[16].

Brazil: The use of endosulfan on soybeans had destroyed not only target pests but also beneficial insects, with the consequence of massive insecticide resistance problems and increased pest problems. A joint campaign with the participation of farmers, extension workers and the media supported the organic soy movement. Today, many producers grow soybeans without endosulfan by using beneficial predator insects and parasitic wasps against caterpillars. With 6.5 million hectares Brazil has the fourth biggest area under organic cultivation worldwide with a yearly growth of organic land of 20-25% during recent years[16,17].

Growing crops without endosulfan - experiences from EUROPE

Germany: Endosulfan lost its national registration approval in Germany in 1991. It had been applied against sucking and chewing insects and mites in vegetable and fruit production. Endosulfan has been replaced by other chemical pesticides, non-chemical pest management methods and Integrated Pest Management (IPM) strategies. Today, about 80% of Germany's pip fruit production and 50-60% of stone fruit production is grown according to IPM standards. These standards forbid the use of pesticides that are hazardous to aquatic systems, restrict the use of certain products like growth regulators and support the use of non-chemical pest control methods[18]. Growers have found that endosulfan is not necessary.

United Kingdom: Quality demands from large retailers play a growing role within the setting of production standards. While no single supply chain or supermarket has prohibited endosulfan, several have considerably restricted its use and/or plan to phase out its use in the near future. For specific products, for example coffee, there are already some consumer labels that guarantee, or are working towards, endosulfan-free production. The Fair Trade Labelling Organisation (FLO) does not permit the use of endosulfan in fair trade coffee, while Rainforest Alliance recently announced it will phase out endosulfan use in all its crops by mid-2011[19].

Alternative Protection Methods

No use of chemical pesticides

Growing without chemical pesticides is based on alternative preventive and curative pest control methods. To prevent infestation, alternative practices include the choice of varieties, crop rotation, intercropping, planting of trap plants and plants that serve as habitats for beneficial insects, companion planting to deter pests, field sanitation, and mechanical methods. If preventive measures are not sufficient, insecticides derived from natural plant extracts, natural soaps, minerals or naturally occurring pathogens like Bacillus thuringiensis (Bt) (as a spray, not as a genetically engineered part of the crop itself), plant extracts like neem, lemon grass, garlic, ginger, marigold, turmeric and many more can be applied. Organic agricultural producers are dedicated to these principles. Internationally, the International Federation of Organic Agricultural Movements (IFOAM) is leading and uniting the organic movement. For small scale farmers and extension services the online information service for non chemical pest management in the tropics (OISAT) from PAN offers useful information[20].

Restricted chemical use

Integrated pest management (IPM) strategies do not reject the use of synthetic pesticides in general. The goal of integrated pest management is not to eliminate all pests but to reduce pest populations to levels that do not cause economic damage to the crop. The control tactics used in integrated pest management include pest resistant or tolerant plants and cultural, physical, mechanical, biological and chemical methods. IPM has the potential to restrict the use of certain pesticides but allows pesticide application if non-chemical methods are not sufficient or not appropriate for economic reasons.

References

1 For more detailed information about endosulfan effects on humans and the environment: M. Watts (2008): Endosulfan Monograph. http://www.panna.org/files/PAN%20Int%20Endosulfan%20Monograph.pdf

2 PAN International Position Paper (2007): For the Inclusion of Endosulfan into the PIC Procedure of the Rotterdam Convention http://www.panna.org/files/endosulfanFactSheet200703.pdf

3 Watts, M (2007). Pesticides and Breast Cancer: A Wake Up Call. Pesticide Action Network Asia & the Pacific, Penang.

4 Grunfeld, HT, Bonefeld-Jorgensen, EC. (2004) Effect of in vitro estrogenic pesticides on human oestrogen receptor alpha and beta mRNA levels, Toxicol. Lett.151(3)467-80.

5 Ibarluzea, JmJ, Fernandez, MF, Santa-Marina, L, et al. (2004) Breast cancer risk and the combined effect of environmental estrogens, Cancer Causes Control, 15(6)591-600.

6 Soto, AM, Chung, KL, Sonnenschein, C (1994)The pesticides endosulfan, toxaphene, and dieldrin have estrogenic effects on human estrogensensitive cells, Environ. Health Perspect., 102(4)380-383.

7 PANAP 2008 Endosulfan monograph.

8 PAN UK (2006) Living with poison. Problems of endosulfan in West Africa cotton growing systems. PAN UK. London. http://www.pan-uk.org/Projects/Cotton/Resources/index.html#other

9 Eyhorn, F (2007) Organic farming for sustainable livelihoods in developing countries? The case of cotton in India. vdf Hochschulverlag AG, 224 pages. ISBN: 978-3-7281-3111-9

10 Eyhorn, F., Ratter, SG, Mahesh Ramakrishnan (2005) Organic Cotton Crop Guide. A manual for practitioners in the tropics. FiBL, 1st edition, 2005, ISBN 978-3-906081-67-0

11 Eyhorn, F (2007): Organic farming for sustainable livelihoods in developing countries? The case of cotton in India. vdf Hochschulverlag AG p. 106-107. ISBN: 978-3-7281-3111-9

12 Manuweera G, Eddleston M, Egodage S, Buckley NA (2008). Do targeted bans of insecticides to prevent deaths from self-poisoning result in reduced agricultural output? Environ Health Perspect 116 (4) 492-5.

13 www.OBEPAB.bj

14 PAN UK (2008) Wear Organic Newsletter - March 2008

15 Vodouhe, SD (2007) Benin organic cotton project. Presentation in ‚Mode macht Menschen'. PAN Germany, Hamburg.

16 Fernando Bejarano González et al. (2008) : El endosulfán y sus alternativas en América Latina.

17 For more information see Endosulfan and their alternatives in Latin America www.rap-al.org

18 Fachgruppe Obstbau im Bundesausschuss Obst und Gemüse http://www.obstbau.org/content/service/wissenswertes/kontrollierter_anbau.php

19 PAN UK (2008) Reducing hazardous pesticide practice in coffee supply chains. Food & Fairness case study. London, July 2008.

20 OISAT (2004): Online Information Service for Non-Chemical Pest Management in the Tropics. PAN Germany. http://www.OISAT.org/

For more information:

- EJF (2005): White Gold: the true cost of cotton. Environmental Justice Foundation, London
- EJF (2002): End of the Road for Endosulfan: A Call for Action Against a Dangerous Pesticide. Environmental Justice Foundation, London, UK.
- SIBAT (1999): Keeping the Balance! Alternative Pest Management Training Manual for Rice. Sibol ng Agham at Teknolohiya (SIBAT); Rural Reconstruction Alumni and Friends Association (RRAFA); Centre for Environment, Technology and Development, Malaysia (CETDEM); Pesticide Action Network—Indonesia; Pesticide Action Network Asia and the Pacific (PAN AP). Quezon City, Philippines.
- PANAP (2008): Endosulfan Monograph by Dr. Meriel Watts. http://panap.net/uploads/media/Endosulfan-Monograph2008June.pdf
- PAN Germany (2008). How to Grow Crops Without Endosulfan: Field Guide to Non-Chemical Pest Management. Pesticide Action Network Germany. http://www.pan-germany.org/download/field_guide_without_endosulfan.pdf .
- PANNA (2008): Endosulfan around the world. http://www.panna.org/node/1686
- PAN UK (2004): Growing coffee without endosulfan. http://www.pan-uk.org/pestnews/Issue/pn66/pn66p10.htm

Photo credits:
Saro Ratter: sunflower, cover, page 6, back
ENDA Pronat field visit, cover, page 6
PAN Africa: pesticides, cover, page 1; OBEPAB: Callisulfan, page 3
pixelio: Carsten, rize, page 4 / Manfred Rose, cotton, page 4
Franz Haindl, soy, page 5 / Katharina Höhmann, coffee, Page 5
S. Haffmans, apple, page 5
http://commons.wikimedia.org/wiki/Image:BlankMap-World-IOC.png , worldmap, page 3

Layout: Anja Scheid, design-im-dienst.de

We want to thank Misereor and Oxfam Novib for their financial support.

Contact: PAN International working group Alternatives to Synthetic Pesticides

Susan Haffmans · PAN Germany · Pestizid Aktions-Netzwerk e.V. Nernstweg 32 · 22765 Hamburg
Tel: +49 (0)40 - 399 19 10-0 · e-mail: info@pan-germany.org · www.pan-germany.org

Pesticide Action Network (PAN) is a network of over 600 participating nongovernmental organizations, institutions and individuals in over 90 countries working to replace the use of hazardous pesticides with ecologically sound and socially just alternatives. PAN was founded in 1982 and has five independent, collaborating Regional Centers that implement its projects and campaigns. www.pan-international.org