Vector Control

What are vectors?

Vectors are living organisms that serve as vehicles to transmit a pathogen (a disease-causing agent like a virus or parasite) from a host to a human or to an animal or both. They are predominantly pests, such as insects and ticks. Birds and mammals such as rats and mice can also be considered vectors, as they both can carry and transmit disease.

How big is the problem of vector-borne disease?

Vector-borne diseases account for 17 percent of the estimated global burden of all infectious diseases. They have a significant negative impact on human and animal health, along with huge economic implications due to reduced human capacity and extra strain on health services. Here are some of the biggest threats today:

- **Malaria** has the biggest impact on human health. Despite a 42 percent reduction in malaria mortality rates since 2000 due to improved control measures, malaria still kills one child almost every minute[1].
- **Dengue fever** incidences have grown dramatically around the world in recent decades. The World Health Organization (WHO) estimates there may be 50–100 million dengue infections worldwide every year[2].
- **River blindness**, also known as onchocerciasis, is a parasitic infection spread by the bites of small black flies that breed in rapidly flowing rivers. It is one of the leading causes of preventable blindness in the world and is endemic to 36 countries in Africa and Latin America[3].
- **Chagas** disease is spread by infected bugs. About 7 million to 8 million[4] people are estimated to be infected worldwide, mostly in Latin America. The disease that starts with swelling of the eyelids, fever and fatigue, but can lead to malnutrition, cardiac disorders and even heart failure.
- **Sleeping sickness** occurs in 36 sub-Saharan Africa countries where tsetse flies transmit the disease to humans. In cattle the disease, called Nagana, kills millions of cattle a year[5].

Mosquitoes are vectors for some of humanity's most deadly illnesses

1 http://www.who.int/mediacentre/factsheets/fs094/en/
2 http://www.who.int/mediacentre/factsheets/fs117/en/
3 http://www.who.int/mediacentre/factsheets/fs374/en/
4 http://www.who.int/mediacentre/factsheets/fs340/en/
5 http://www.fao.org/ag/againfo/programmes/en/paat/disease.html

Why is vector control important?

Given the dramatic impact vector-borne diseases can have on humans and animals, vector control must play a vitally important role in public health and livestock management programs around the world. Without these interventions, dangerous diseases would proliferate unchecked and with the increased movement of populations and livestock, the global spread of disease is a growing concern.

Vector control is crucial to reduce the incidence of infection from diseases; this is especially important for those for which there is currently no effective cure or preventive medical measures available, such as Dengue, West Nile virus and Chikungunya virus. Even for vector-borne diseases for which effective and targeted medical treatment exists, such as malaria, issues such as cost, delivery, correct diagnosis, drug resistance and other challenges make disease control through the use of medical drugs alone an unrealistic alternative to disease prevention by vector control. Both prevention and treatment are needed.

What are the methods of vector control?

Vector control involves using preventive methods to eradicate or control vector populations, in order to limit the transmission and spread of diseases. Preventative measures include:

- **Habitat control:** Removing or reducing the number of places where the vector can breed helps to limit populations from growing excessively. For example, by removing stagnant water, removing old tires and empty cans which serve as mosquito breeding habitats and through good management of used water.
- **Reducing contact with vectors:** Reducing the risk of exposure to insects or animals that are vectors of diseases can limit the risk of infection. For example, using bed nets, adding window screens to homes, or wearing protective clothing can help reduce the likelihood of coming into contact with vectors. An important component of exposure reduction is also the promotion of health education and raising awareness of risks. Bed nets treated with insecticide can reduce the risk of insect bites and infection.
- **Chemical control:** Insecticides, larvicides, rodenticides and repellents are used to control pests and can be used to control vectors. For example, larvicides can be used in mosquito breeding zones; insecticides can be applied to house walls (indoor residual spraying); bed nets treated with insecticide and use of personal skin repellents can reduce the risk of insect bites and thus infection. The use of pesticides for vector control is supported by the World Health Organization (WHO) and has proven to be highly effective.
- **Biological control:** The use of predators (natural enemies of the vectors), bacterial toxins or botanical compounds can help control vector populations. For example, using fish that eat mosquito larvae or the introduction of sterilized male tsetse flies in order to reduce the breeding rate of these flies are methods to control vectors and reduce the risk of infection.

All these measures are important elements for an integrated approach to control the spread of vector-borne diseases. The choice of the most appropriate method(s) to use depends on the disease pattern and behavior of the vector.

How do pesticides help?

Chemical control of vectors using pesticides is a key element in the fight against vector-borne diseases. When used properly and as part of Integrated Vector Management (IVM) framework, pesticides can effectively and safely control disease-transmitting pest populations and prevent potential outbreaks. In many situations the use of pesticides is the most cost-effective method available. Methods include:

- **Avoiding the risk of biting or contamination:** Insecticides are incorporated in, or coated onto, textile materials such as mosquito nets or other treated materials such as clothing, curtains, tarpaulins and tents. Long-lasting insecticidal nets provide personal protection and can also protect communities, if the coverage with nets is high enough. In the last decade the distribution of nets has helped reduce cases of malaria by 31 percent in Africa and in 2014, 200 million new nets will be delivered to affected countries[6]. The use of household insecticides (e.g. coils, vaporizers, aerosols) can also provide effective protection from vectors.
- **Limiting the growth of populations at an early stage:** Larvicides have been used worldwide since 1965 in programs to reduce mosquito populations by treating breeding grounds.
- **Dealing with adult populations:** Indoor Residual Spraying (IRS) and Outdoor Space Spraying (OSS) are used to control the adult stages of the vector insect. IRS is the most effective way to rapidly reduce mosquito density and can be effective for up to several months depending on the product used. In 2012, 135 million people worldwide were protected by IRS[7].

The use of pesticides for vector control is done through the Integrated Vector Management framework, to ensure pesticides are used responsibly, and in the most effective manner in combination with other methods when appropriate. IVM is defined by the WHO as the rational choice of vector control method for optimum use of resources[8]. This may include combining interventions such as using various pesticides in parallel and in combination with non-chemical methods to provide a comprehensive response to the problem. However, it may also refer to pesticide use alone as is the case with IRS, where pesticide use combined with training and monitoring forms the 'integrated' approach.

6 http://www.who.int/malaria/publications/world_malaria_report_2013/report/en/
7 http://www.who.int/malaria/publications/world_malaria_report_2013/report/en/
8 http://www.who.int/neglected_diseases/vector_ecology/ivm_concept/en/

What is the industry doing?

Most CropLife International member companies and other specialized manufacturers develop products designed specifically to control vectors; predominantly to combat disease transmission by insects. In addition, these companies are actively involved in working with governmental and non-governmental bodies around the world to improve the registration processes for vector control products to help accelerate the availability of these life-saving products in the market and for programs run by government or international organizations.

Industry continues to make significant investment in research and development to find new and innovative products for vector control, including:

- Developing advanced long-lasting insecticidal net technology
- Introducing new long-lasting insecticidal sprays for indoor residual house spraying
- Finding completely new insecticides and pesticide products to combat insecticide resistance which is a growing and major threat to vector control programs

BLOCK THE BITE

PROTECTING AGAINST VECTOR-BORNE DISEASES

Block the Bite is our campaign to raise the issue of vector-borne diseases and focus on the importance of prevention through vector control products.

Click on the links below for a range of **infographics** and **posters** or download them at **croplife.org**.

- **Click here** for our infographic on mosquito nets
- **Click here** for our infographic on residual spraying
- **Click here** for our bed net poster
- **Click here** for our innovation poster
- Follow us on Twitter @**blockthebite**

How is the industry represented?

The CropLife International Vector Control Team is the leading voice and advocate for the vector control industry. It is made up of private sector members who research and develop insecticides and related products to make sustainable and lasting contributions in the fight against vector-borne diseases.

Member companies of CropLife International working on vector control are BASF, Bayer, Sumitomo Chemical and Syngenta. Other specialized manufacturers working on the CropLife International Vector Control Team are Vestergaard, Bestnet, NRS (Tana Netting) and Shobikaa Impex.

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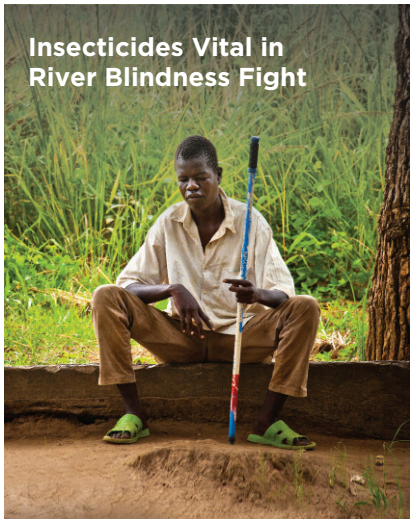

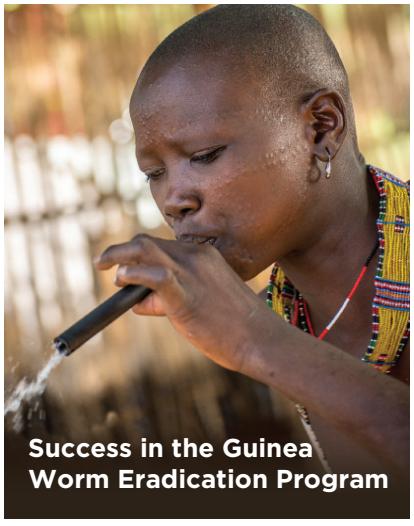

For more information, visit

http://croplife.org/global-issues/public-health-and-vector-control/

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