Insecticide plastic masterbatches – used to control pests in agricultural, horticultural, forestry, home and golf course applications
Symphony’s comprehensive line of d₂p masterbatches, compounds and additives offers unprecedented opportunities to improve the properties, performance and quality of finished products, while optimizing productivity and costs.

d₂p family product line includes an exceptionally broad selection of standard additive masterbatches for use with all commercially available polymers.

In addition, we can develop custom masterbatches as well as masterbatches combining active ingredients with selected stabilizers, processing aids, or even pigments and dyestuffs, in order to meet virtually any special customer requirement.

d₂p Al masterbatches are intended for applications in plastic packaging and netting and designed in particular for markets in Africa, Asia and Latin America.
Effective Chemical: Chlorpyrifos

Biocide efficacy:
Mosquitoes, Cockroaches, grubs, flea beetles, fire ants, thrips, Lepidoptera and aphids

Action:
Works on contact, inhalation and ingestion simultaneously

Applications:
Flexible plastic film or netting in agricultural, horticultural, forestry applications

E.G. Banana bags, ground sheets etc...
Effective Chemical: Bifenthrin

Biocide efficacy:
Mosquitoes, Red fire ants, aphids, worms, gnats, moths, beetles, grasshoppers, mites, midges, spiders, ticks, yellow jackets, maggots, thrips, caterpillars, flies, fleas and mealybugs

Action:
Influences insect nervous system

Applications:
Flexible plastic film or netting in agricultural, horticultural, forestry and home pest control.

E.g. Banana bags, ground sheets, pet strips, grow bags, tree bags etc.

Now being used in yarn for clothing and in paint.
Effective Chemical: Deltamethrin

Biocide efficacy:
Spiders, fleas, ticks, carpenter ants, carpenter bees, cockroaches, bed bugs, anopheles gambiae, tsetse fly, mealybugs and lepidoptera

Action:
Ingestion and direct contact

Applications:
Flexible plastic film or netting in agricultural, horticultural, forestry and home pest control.

E.g. Banana bags, ground sheets, pet strips, grow bags, tree bags etc.
Effective Chemical: Buprofezin

**Biocide efficacy:**
Used to control homopteran pests e.g. aphids and red cotton bugs

**Action:**
Insect growth regulator / chitin synthesis inhibitor, preventing the proper formation of exoskeleton after moultiong

**Applications:**
Flexible plastic film or netting in agricultural and horticultural applications
Effective Chemical: Permethrin

Biocide efficacy:
Used as an insecticide, acaricide and insect repellent.

Action:
Neurotoxin, affecting neuron membranes.

Applications:
Flexible plastic film or netting in agricultural horticultural applications.

Effective insect repellent in fibre and exterior paint.
LONG LASTING INSECT NETS

A mosquito net offers protection against mosquitoes, flies and other insects and thus against the diseases they may carry, which could include:

• Malaria
• Dengue
• Yellow fever
• And various forms of encephalitis including the West Nile Virus
Mosquito Nets

Mosquito nets are mainly used for protection against the malaria transmitting vector, the Mosquito Anopheles gambiae.

To be effective, the mesh of a mosquito net must be fine enough to exclude such insects without reducing visibility or restricting airflow.

It is possible to increase the effectiveness of a mosquito net greatly by treating it with an appropriate insecticide mosquito repellent.

Mosquito nets are used where malaria or other insect-borne diseases are common.
Bednets

Nets can be made from cotton, polythene, polyester, propylene or nylon.

Mosquito nets treated with insecticide are known as insecticide-treated nets (ITNs) or bednets.

A mesh of 1.2mm stops mosquitoes and smaller (0.6mm) biting insects.

An insect can bite a person through the net, so the net must be large enough to cover the area without resting on the skin.

ITNs are at least twice as effective as untreated nets.

They offer over 70% protection.

These nets are dip-treated using a synthetic insecticide.

ITNs need to be impregnated with the insecticide every six months to remain effective.
A more efficient method

A more efficient method is the incorporate (via an extrusion process). This is the newest technology and the long-lasting insecticidal nets (LLINS) have now replaced ITNs in most countries.

The distribution of mosquito nets or bednets impregnated with insecticides has been shown to be an extremely effective method of malaria prevention. It is also one of the most cost-effective methods of prevention.
LLINs (Long-lasting insect nets)

LLINs have been shown to be the most cost-effective prevention method against malaria and are part of WHO’s Millennium Development Goals (MDGs).

LLINs protect the individuals or households that use them. The protection of people in the surrounding community is achieved in one of two ways.

First – LLINs kill adult mosquitoes infected with the malaria parasite directly which increases their mortality rate and can therefore decrease the frequency in which a person in the community is bitten by an infected mosquito.

Second - certain malaria parasites require days to develop in the salivary glands of the vector mosquito. This process can be accelerated or decelerated via weather; more specifically heat. *Plasmodium falciparum*, for example, the parasite that is responsible for the majority of deaths in Sub-Saharan Africa, takes 8 days to mature. Therefore, malaria transmission to humans does not take place until approximately the 10th day, although it requires blood meals at intervals of 2 to 5 days.

By killing mosquitoes before maturation of the malaria parasite, LLINs can reduce the number of encounters of infected mosquitoes with humans.
Reducing the number of mosquitoes in the environment

When a large number of nets are distributed in one residential area, their chemical additives help reduce the number of mosquitoes in the environment. With fewer mosquitoes, the chances of malaria infection for recipients and non-recipients are significantly reduced.

There are three types of LLINs:

- Polyester netting which has insecticide bound to the external surface of the netting fibre using a resin
- Polyethylene which has insecticide incorporated into the fibre
- Polypropylene which has insecticide incorporated into the fibre

All types can be washed at least 20 times, but physical durability will vary.
Efficacy of LLINs

A survey carried out in Tanzania concluded that:

Effective life of polyester nets is 2 to 3 years.

LLINs with polyethylene will last over 5 years of life and there are trials in showing nets which were still effective after 7 years. (If the right masterbatch is incorporated at the right addition rate).
When calculating the cost of LLINs for large-scale malaria prevention campaigns, the cost should be divided by the number of years of expected life:

A more expensive net may be cheaper over time.

In addition the logistical costs of replacing nets should be added to the calculation.
Trials

A review of 22 randomized controlled trials of LLINs found (for Plasmodium falciparum - malaria) that using the nets can reduce deaths in children by one fifth and episodes of malaria by half.

In areas of stable malaria using the nets, reduced the incidence of uncomplicated malarial episodes by 50% compared to no nets, and 39% compared to untreated nets.

In areas of unstable malaria it reduced by 62% compared to no nets and 43% compared to untreated nets. As such the review calculated that for every 1000 children protected by nets, 5.5 lives would be saved each year.
Symphony uses, as active ingredients, only pyrethroid insecticides as these insecticides have been shown to pose very low health risks to humans and other mammals, but are toxic to insects and kill them, even at very low doses.

The pyrethroids we use:

• Do not rapidly break down
• Are stable against exposure to heat
• Withstand multiple washing (minimum 20)
• Stable in sunlight (if used outdoors)
• Poorly absorbed by skin, are not skin sensitizers (one of them is actually used in the pharmaceutical industry as a first-line treatment against scabies or head lice)
• Biodegradable (if accidentally released in the environment)
• Mechanism of action: functions as a neurotoxin, affecting neuron membranes by prolonging sodium channel activation
• They have a low mammalian toxicity and is it has a low mammalian toxicity and is poorly absorbed by skin
We developed two formulations for such applications: 91142 and 91150 both based on pyrethroids with long stability, low toxicity, low water solubility and both registered in the EU, USA and Asia.

We offer solutions for PE and PP, with the actives incorporated into the polymer fiber via a masterbatch. LLINs incorporating 91142 or 91150 will withstand 20 washes and will last minimum 5 years.

The masterbatches ensure even and quality controlled insecticide application.

Standardized Monofilament Polyethylene (LLIN) has a weight of approx. 625 grams.
More applications

The same active ingredients can also be used in applications as:

as an insecticide
  in agriculture, to protect crops
  in agriculture, to kill livestock parasites
  for industrial/domestic insect control
  in the textile industry to prevent insect attack of wool-made products

as an insect repellent or insect screen
  in timber treatment
  as a personal protective measure (cloth impregnation, used primarily for US military uniforms and mosquito nets)
  in pet flea preventative collars or treatment
In recent years, plastic sheeting (polythene tarpaulins) has replaced canvas as the utilitarian shelter material for displaced populations in complex emergencies. Advances in technology enable polythene sheeting to be impregnated with pyrethroid during manufacture.

Insecticide-treated plastic tarpaulins for control of malaria vectors in refugee camps
Thank You!