

# NOTES ON PYRETHRUM

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## INTRODUCTION

Pyrethrum (*Chrysanthemum cinerariifolium*) was introduced as a cash crop into the Papua New Guinea Highlands in 1961. It is valuable because it is used to make a very useful and safe insecticide.

An article in an earlier issue of HARVEST (Volume 6(2):47-52) gave details about the best ways to grow and harvest pyrethrum. The purpose of this article is to give more information about pyrethrum and its uses.

## HISTORY

People have known for hundreds of years that pyrethrum flowers contain an insecticide. A related species (*Chrysanthemum coccineum*) was probably first grown for the insecticide in the Middle East (e.g. Iran). Since the 1800s, *C. cinerariaefolium* has been introduced into Europe, North America and Japan, and later to Africa and South America.

In recent years the main producers have been African countries. For example, in 1971-2, Kenya and Tanzania supplied 85% of the total world production. Most of this was grown on small farms of under 4.5 hectares. Other countries producing it today include Ecuador, Papua New Guinea, Brazil, Zaire,

Indonesia, India, U.S.S.R., Taiwan, Zimbabwe and South Africa.

It has been found that pyrethrum grows best in cool mountain valleys. In order to flower, the plants must have at least 6 weeks at a mean temperature of less than 17°C. If there is more than one week at over 24°C, the buds will not form. The crop grows well if rainfall is about 1200 mm, spread throughout the year.

## PROPERTIES OF PYRETHRUM

### Pyrethrins

The chemicals which are used to make the insecticide Pyrethrum are called pyrethrins. Pyrethrins are concentrated mainly in the fully opened flowers. They are extracted from the dried flowers in a factory.



A field of pyrethrum in the highlands





*Harvesting pyrethrum*

It is possible for a farmer to use his own flowers as an insecticide. The pyrethrins can be extracted from the dried flowers by soaking them overnight in kerosene and then spraying the whole mixture on insect pests. However, the farmer must be careful, as kerosene may damage some crops.

Another way is to grind the dried flowers really small and sprinkle them over the crop. This method is not as good as spraying a liquid, but if the flowers are ground really well, insects will be killed.

#### No residues

A very useful property of pyrethrins is that they break down in air and sunlight. This means that no residues (waste materials) are left in the soil after treatment with Pyrethrum. Unwanted residues have been a major problem with some of the synthetic (man-made) insecticides.

At the same time, because Pyrethrum is affected by sunlight, it has less time to be effective in the field. Once the chemicals have broken down, the insecticide no longer works.

However, if a spraying programme is planned well, pests can be controlled successfully. A farmer should observe carefully the time of day when his pests are most active and most numerous. At this time, he should spray with Pyrethrum. If the pests are most active at dusk, this is good for the farmer, because then there is no sunlight to break down the pyrethrins. Therefore, the effect of the insecticide will last longer.

#### Resistance

A big advantage of Pyrethrum is that because of its rapid breakdown, there is less chance of insects developing resistance (not being killed) to it. Resistance is a big problem with synthetic insecticides.



*Drying pyrethrum flowers*



## Synergists

One way of improving the toxicity (poisoning power) of Pyrethrum is to use special compounds called synergists. The synergists, if used alone, are not good insecticides, but if combined with Pyrethrum they increase its toxicity very much. Therefore, the insecticide works more quickly and there is a better chance of killing enough insects to achieve control. The most commonly used synergist is Piperonyl butoxide. Further research is still going on.

Synergists are important also because they make Pyrethrum cheaper. Pyrethrum used alone is one of the most expensive insecticides.

## The effects of Pyrethrum

Pyrethrum is a 'contact' insecticide. It causes paralysis (loss of movement) or 'knock-down' when it is sprayed onto insects. It does not have to be eaten.

Insects in flight are knocked down very quickly when in contact with a Pyrethrum spray. Insects on a solid surface become more active before being paralysed. This period of activity is useful as it can cause insects such as cockroaches to leave their hiding places.

The dose needed to kill is much higher than the knockdown dose. If not enough Pyrethrum is used, insects will recover.

## Pyrethrum is safe

Although it is very poisonous to insects, Pyrethrum is safe to man and other mammals if it is eaten or sprayed on them. It is dangerous only if it is injected into the body. Also it does not build up in the tissues of mammals.

In the concentrations used to kill insects, Pyrethrum does not harm birds, fish or plants. It has even been suggested that Pyrethrum stimulates some plants to grow.

## USES OF PYRETHRUM

Pyrethrum is traditionally used as a fly spray in the home. It is also useful in agriculture, horticulture and forestry. Some of its special uses are listed here.

1. An early use was to control intestinal worms in humans. It has been used for the same purpose on sheep and lambs. Large doses taken by mouth produced no side effects.
2. The quick 'knockdown' effect of pyrethrins burnt in mosquito coils reduces annoyance from mosquitoes as they are put out of action before they can bite.
3. Aerosol sprays of Pyrethrum are used for killing insects in aeroplanes and in the home.
4. Woollen fabrics can be protected from insect damage when stored by using Pyrethrum.
5. In Uganda, Pyrethrum is used as a dip to protect fish from blow fly damage while being sun-dried.
6. Pyrethrum controls fruit flies in the tomato canning industry in America.
7. In Australia, paper and cardboard food packages have been made insect-proof using Pyrethrum.
8. An unusual use is the protection of sorghum grain in



traditional methods of brewing beer by the Bantu people of southern Africa. The insecticide does not affect the flavour of the beer.

9. In northern Europe, Pyrethrum is used to kill aphids.
10. Mixtures of pyrethrum and honey or herbs are recommended as a treatment to improve masculine vigour.
11. After pyrethrins have been taken out from the dried flower heads, the material left is known as Marc. It is used in making mosquito coils. Pyrethrum Marc is also used as a livestock feed in east Africa. The small amounts of pyrethrins in Marc are thought to help control intestinal worms in livestock.

## CONCLUSION

*Chrysanthemum cinerariaefolium* is very useful as a source of a most effective insecticide. This insecticide, Pyrethrum, is better than some synthetic insecticides. First, it does not leave unwanted residues in the soil. Second, it is harmless to plants and animals unless it is injected into the body or sprayed in very large amounts.

On the other hand, because there is so much work in growing and harvesting pyrethrum flowers, Pyrethrum costs much more than many synthetic insecticides. Also, it is inferior to many synthetic insecticides for use where a long lasting killing effect is needed.

## THE FUTURE OF PYRETHRUM

Because of the high cost of producing pyrethrum, some big companies are making insecticides which contain synthetic pyrethrins. These are called pyrethroids and they are made a little different from pyrethrins, to make them last longer.

Some research workers are now finding that pests can become resistant to pyrethroids.

This leads to a very important question: 'Can insects which are resistant to synthetic pyrethroids become resistant to the natural pyrethrins?'

If the answer is 'Yes', then the future of the Pyrethrum industry is in danger.

Many farmers and other people working in the industry will be out of work. Also, the safety advantages of Pyrethrum will be lost, as stronger insecticides will be necessary for pest management.

## FURTHER READING

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