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## **A Brief History of IPM**

### *Early Pesticide Use*

The use of chemical pesticides in agriculture has a long history. For example, the ancient Sumerians used sulphur to control insects and mites as early as 2500 BC.

### *The Green Revolution*

It was only after World War II that chemical pesticides and other agrochemicals were widely adopted as part of the "green revolution". Chemical pesticides had many advantages, and became an integral part (along with chemical fertilizers, mechanization, and high-yielding crop varieties) of modern agriculture. A large proportion of the productivity increases seen during the "green revolution" were due to the widespread use of new pesticides. Often these agrochemicals were applied on a routine or prophylactic basis, resulting in immediate yield increases but contributing to future environmental, agricultural, and socio-political problems.

### *Environmental Awareness*

By 1962, when "Silent Spring" by Rachel Carson was published, serious concerns about the disadvantages of pesticide use were widely raised. Carson and others suggested that pest control methods other than chemical pesticides should be used in order to protect wildlife, human health, and the environment. Public pressure led to government legislation restricting pesticide use in many countries, causing agriculturists to reconsider the heavy use of persistent pesticides such as DDT.

### *Ecological Backlash*

As early as the 1950's, pesticide-induced problems such as pest resurgence, pest replacement, and pesticide resistance were causing problems in agriculture. In 1959, scientists discovered that aphids could be better controlled by reducing the amount of pesticide used. This was because the pesticides were killing aphid predators as well as the aphids themselves, causing large-scale pest resurgence (Stern, et al., 1959). Reducing the amount of pesticide allowed natural predators to survive, resulting in both biological and chemical control of the aphids.

### *Integrated Control*

This idea of integrating biological and chemical control of pests was termed "integrated control". It focused on conserving natural enemies of pests through the selective use of insecticides that were compatible with natural enemy conservation. This type of control was often 'supervised' by qualified entomologists who used monitoring of pest and natural enemy populations to guide spraying decisions. A key aspect of integrated control was the implication that two control methods - chemical and biological - should work in harmony, and that this combination was assumed to be better than either method by itself.

### *Pest Management*

The concept of 'pest management' was proposed in 1961 (Geier and Clark, 1961). Pest management was aimed at

"the reduction of pest problems by actions selected after the life systems of the pests are understood and the ecological and economic consequences of these actions have been predicted, as accurately as possible, to be in the best interests of mankind."

Pest management was holistic. It synthesized knowledge and ideas from a broad range of disciplines, and it was grounded in basic population theory. It also implied that pest species could exist in the agroecosystem as long as they weren't causing damage to the crop.

Pest management did not assume that a combination of biological and chemical control was always the best option. If chemical control alone was predicted to be better than chemical and biological control combined, then chemical control alone would be selected under this system.

### *Integrated Pest Management*

The term Integrated Pest Management was formalized by the US Academy of Sciences in 1969. IPM was largely a combination of the above concepts. It added other methods of control besides chemical pesticides and natural enemies, such as host-plant resistance and cultural/physical controls. It applied the concept of integrated control to all pests, not just insects. Control methods had to be compatible with other control methods for the same pest as well as other control methods for other pests. IPM drew knowledge from entomology, plant pathology, nematology, weed science, and other disciplines.

IPM was adopted as policy by various world governments during the 70's and 80's, including the USA (1972), Malaysia (1985), the Philippines (1986), and Indonesia (1986). Since then, there have been numerous success stories of successful IPM programs around the world.