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Research on Natural Pesticides in Traditional Agriculture

Natural pesticide is folk knowledge, it is different from modern science and technology. It is created by the indigenous people, or farmers, and not scientists. Therefore natural pesticide is different from modern science and technology in aspects such as dissemination, use and protection of intellectual property rights. It has its own features and dissemination method. The rational components of traditional indigenous knowledge could be the source or prototype for modern science and technology.

China is the first documented country which uses insecticidal plants. According to the Rites of Zhou, one of three ancient ritual texts in Confucianism, people have used the Rhizome of Mioga Ginger and the toxic star anise over 3,000 years ago to remove pests on human body and storage pests. Till the Warring State period in the third century BC, due to the continuous growth in experience, over 200 drugs have been developed. By the Eastern Han dynasty (approximately 220 BC) when the first drug monograph *Shen Nong's Herbal Classic* was produced, 365 drugs have been documented. During the Ming dynasty, Li Shizhen's masterpiece on Chinese herbal medicine, *Compendium of Materia Medica* documented 1,892 types of drugs, including many herbs with insecticidal effect such as *Stemona tuberosa*, genkwa, veratridine, *Euphorbia jolkinii* and Derris roots. By the 1950s in the 20th century, in order to compensate for the insufficient use of pesticide to control pests, a national natural pesticide survey was conducted and a comprehensive and detailed introduction to China's insecticidal plants was compiled by the then Chinese Natural Pesticide Editorial Committee in the book *China's Natural Pesticides*. The book documents 220 insecticidal plants from 86 divisions, 19 types of soil minerals and other natural pesticides. Through the arrangement of documented formulations of over 260 natural pesticides, we discovered that the traditional knowledge applied in pest control is diverse and rich. Not only can it be used to prevent various crop pests, it can also be used to prevent various diseases in livestock, poultry and fish. Apart from producing the same effects as synthetic pesticides (contact killing, poisoning, fumigation), it also has other unique effects (antifeedant effect, repellent effect, ovicidal, infertility, etc.). For example, it interferes the growth of pests, causes prolonged larval stages, resulting in the increase in adverse natural effects; it can reduce the ratio of pests; and it reduces the population of insects over winter.

The reasonable use of natural pesticides to allow our ancient civilisation to be made known as well as to allow our future generations to benefit from it is the wish of every researcher of traditional knowledge. However, there are all kinds of problems which arise along the way:

1. Collection and dissemination

There is no specific department or agency of the collection and collation of traditional knowledge, there is a lack of uniform standards to measure the traditional knowledge and norms, and there are no ready-made scientific collecting, disseminating and intellectual property protecting methods to be adapted or adopted.

2. Scientific research

Natural pesticides are the fruits of labour of the harmonious interaction between labourers and nature. However, because these technologies are widely used locally as rural practical technologies, they are not as comprehensive and institutionalised as modern science and technology. Hence, they are often regarded as “primary or junior technology” and are being disregarded by scientists and researchers. As a result, there is a lack of assessment of the principles and meaning behind natural pesticides.

3. Farmers’ consciousness

Since the mechanism is different from chemical pesticides, home-made pesticides often only control the occurrence of pests and diseases, such as causing pests to stop feeding on crops or to cause crop damage, but they do not die. At this time, farmers are still cautious and do not want the presence of pests, so they are unwilling to use natural pesticides. They feel that natural pesticides are “troublesome, produce slow effects and are not as quick as chemical pesticides.”

4. Storage

Since the introduction of market-based agriculture and forest production systems and the emergence of commercial seeds and varieties, the local biological diversity seems to have lost its importance. The application of chemicals has reduced the need for natural resistance; youths are leaving the rural areas, resulting in a loss of valuable knowledge which cannot be passed down. The verbal form of dissemination of knowledge cannot adapt to the fast-changing society. These various factors have led to the rapid disappearance of traditional knowledge on natural pesticides.