

Biological Replacement Control of "Crofton Weed"

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New growth of the white-cloud flowering plant reaches out like a sleepy lady stretching, and groping for a handhold. The weed *Eupatorium adenophorum spreng* is often admired by tourists as a decorative plant in China's southwestern Yunnan Province. But to the local people, it is quite another story.

A pasture, for example, was established in 1958 for 600 cows and 200 horses. Four years later, according to a local official in Mojiang County, *Eupatorium adenophorum spreng* intruded and robbed the land of forage grass. Another four years, and only 200 cows were left due to the lack of grass, and all 200 horses had died of asthma brought on by pollen from the weed's crown flower.

The weed had also intruded on 386,667 hectares of rotation farmland, 21.15 percent of the total cultivated dry land, as shown by 1980 provincial statistics. It cost over a hundred million yuan to turn over the soil again.

Young growth of other plants also fell victim to the aggressive weed: seedlings could not compete with its growing speed. The tiny new plants would die of lack of sunlight because of weed cover.

Since the weed caused damage to agriculture, forestry, and husbandry, the local people hate it and call it "big poisonous weed" and "big black head."

They tried everything they could think of to get rid of the Crofton weed. Farmers in Shuangbo County, for instance, dug it out of their farmland, and burnt the land. But the results were just the opposite of what they wanted: the seeds of *Eupatorium adenophorum spreng* fell back into the soil and the fire only fertilized the soil so the weed grew even faster.

Ho Dayu, researcher of the Kunming branch of the Chinese Academy of Sciences, says the weed grows in Mexico, and was introduced to Hawaii and Australia as a decorative plant in the 19th century. In the 1940s it was reported to have started to run wild in Southeast Asia.

Over the past 30 years, he said, the Crofton weed has spread across the whole province of Yunnan and intruded into several other provinces and autonomous regions as well, such as Sichuan and Guangxi.

In 1983, Ho and his two assistants undertook a research project on biological control of the weed. The next year, he brought the tephritid gall fly to Kunming from Tibet. It is a

natural enemy of the Crofton weed.

The tephritid gall fly lays eggs on the weed stems, explained Wei Yi, Ho's assistant. When the eggs are hatched, the flies eat into the soft part of the stems. Twenty days later, they form a gall. This process, Wei continued, prevents the host weed from growing into a coverage state, usually at over two meters high.

The flies, however, could not be released into the afflicted areas at once. First of all, Ho conducted a safety test: "Since Yunnan has various species of plants, we were not sure if the tephritid gall fly would not host on other species of plants as well, apart from the Crofton weed."

Sixty-three plant species were tested from October 1984 to September 1985. The results showed that *Eupatorium adenophorum spreng* was the only plant attacked by the fly.

At the end of 1985, the fly was released to the vast expanse of the afflicted areas in Yunnan. By now the fly has established itself in over 100 kilometers of the weed-intruded areas and is successfully hosting on the weed.

However, the researcher points out, this method alone cannot lead to the extinction of the weed. The number of insects totally depends on the number of weeds, constituting a comparatively stable state of balance. "This method only manages to control the weed intrusion," he explains.

In 1985 Ho Dayu proposed a comprehensive biological control: "That is, replacement control should be conducted right after the application of the fly."

Replacement control takes advantage of the fierce competition for living space among plant species, by planting one or several other species of plants that grow faster than the Crofton weed. Within a short time, varying from months to a year, coverage growth will be established.

Following this method, Shuangbo County planted *Caganusl cagan* on 0.33 hectares of farmland. Within a year, the new plant took over. Neighbouring Simao and Ximong counties have also conducted replacement control, which proved successful.

As early as 1945, the United States introduced from Mexico this same gall fly to its problem areas, and obtained a satisfactory biological control effect. The American experiment was closely followed by similar measures in Australia, New Zealand, and India.

However, according to Chinese Academy of Sciences member Guo Shibao, China may be the first country that has put replacement control into actual practice.