

A close-up photograph of a honeybee hovering over a white rose flower with several pink buds. The background is a soft, out-of-focus green. In the top left corner, there is a small orange horizontal bar.

Biosecurity measures for *Apis cerana* in China

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- More than 4,000,000 *Apis cerana cerana* colonies in China
- Traditional & modern beekeeping
- Mainly distributed in mountainous areas
- Much attention to the pests control



Communication contents

I. Main Pests of *Apis cerana cerana* and Their Control Principles

II. Main Pests Control Measures

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Part I

Main Pests of *Apis cerana cerana* and Their Control Principles

Main pests of *A. cerana cerana*



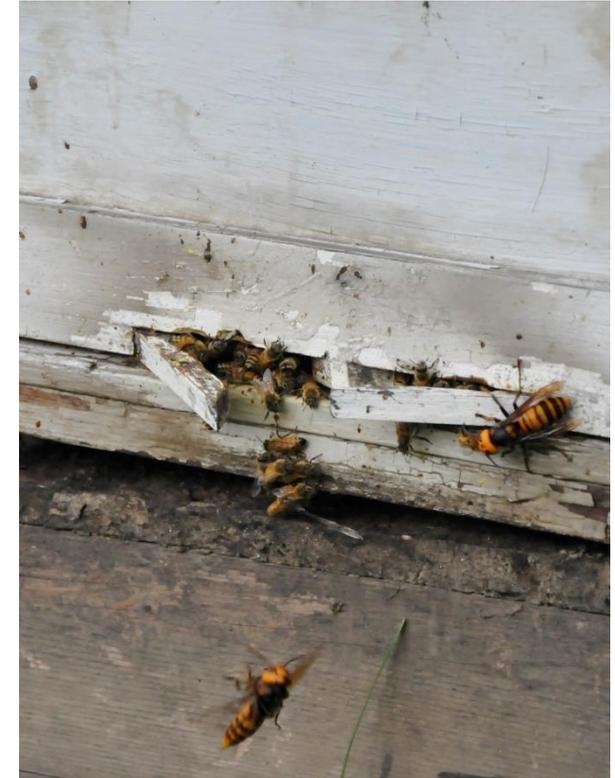
Chinese sacbrood disease



European foulbrood disease



Greater wax moth



Wasp

“Two Diseases” and **“Two Insects”**

Prevention and control principles

Prevention First

- **Keeping apiary clean**
- **Prohibiting random introduction of queens and colonies**
- **Screening for disease-resistant queens**

Strengthen Colony Management

- **Changing queens once or twice a year**
- **Using new comb every year**
- **Leaving enough honey for bees**

Environment-Friendly Control

- **No chemicals**
- **Isolating of unhealthy colonies**
- **Physical control**
- **Biological control**

Part II

Control Measures of Main Pests

1. Chinese sacbrood disease



- **Pathogen:** Chinese sacbrood virus (CSBV).
- **Symptoms:** An uneven brood pattern with discoloured, sunken or perforated capping scattered through the brood cells. The larvae die with its head characteristically raised toward the top of the cell and stretched out on its back in the cell.

Route of CSBV transmission

- **Primary transmission: Infected larvae and contaminated bee bread**
- **In the colony: Feeding nurses**
- **Between the colonies:**
 - Foragers bring virus-infected pollen and nectar back to the colony
 - Feeding contaminated foods, exchanging combs
 - Robber bees, drifting bees, greater wax moth

Prevention and control measures of CSBV

(1) Strengthen colony management

- Keeping the colony warm in early spring and late autumn
- Ensure adequate food, especially pollen

(2) Disinfection prevention

- Keeping the apiary clean, regularly spray the apiary with 5% bleach solution or 10%-20% lime milk
- The hive can be sterilized after scraping
- The comb can be soaked in 5% bleach solution for 12 hours, rinsed several times with clean water, and then dried for later use

(3) Quarantine

- Infected colonies are prohibited from moving to other areas
- The apiary should not randomly introduce queens and colonies

(4) Choose disease-resistant colonies

- Select disease-resistant local colonies, transfer larvae to breeding queens and drones
- Successive generations of selection can increase disease resistance abilities of colonies

(5) Early diagnosis, early isolation

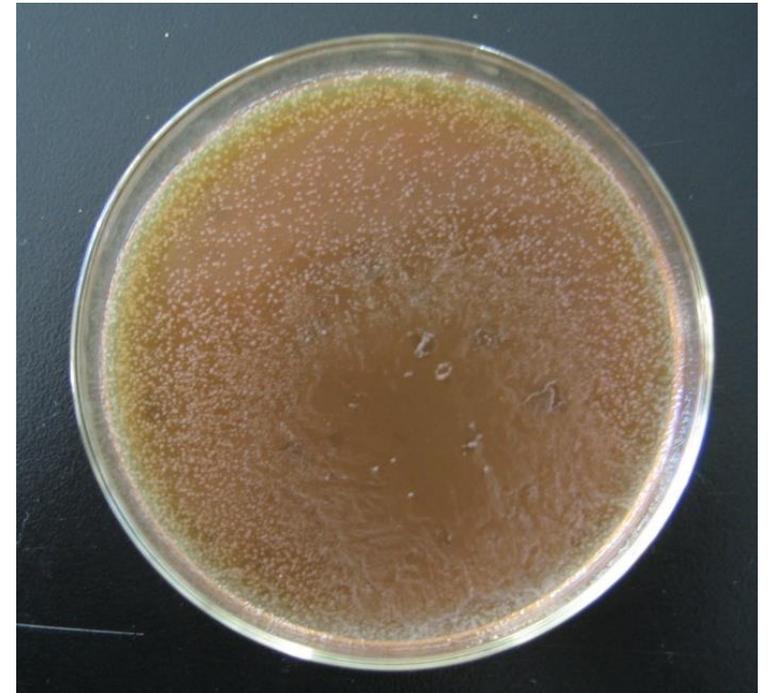
- Rapid diagnosis of CSBV in apiary
- Isolation of the infested colony to a place 1-2 km away apiary



2. European foulbrood disease (EFB)

Pathogen: *Melissococcus pluton*

- *Melissococcus pluton* is a gram-positive bacteria without spore.
- The colonies are milky white with smooth edge and protruding in the middle.



EFB transmission

- *Melissococcus pluton* can survive for many years in the infected larval carcass and remains persistently virulent in pollen and honey.
- **Transmission in hive:** When nurse bees clean up the infected larvae and feces in the brood cells, their mouthparts are contaminated by the pathogens, which are then passed on to the healthy larvae through feeding behavior of honeybee.
- **Transmission between the colonies:** Robber bees, exchange combs.

Symptoms of EFB

- EFB mainly affects unsealed brood, killing larvae before capping.
- A patchy brood pattern with uncapped brood cells, in which the dead or dying larvae curl upwards and appear brown or yellow.
- Larvae carcasses dries up, forming a loosely attached brown scale.
- The brood pattern often appears mottled and erratic, as dead brood is removed by the bees and the queen lays in the vacant cells.



Prevention and control measures of EFB

- (1) Ensure adequate food for colony**
- (2) Prevention of disinfection**
- (3) Quarantine**
- (4) Diagnosis early**
 - Inspect by symptoms
 - PCR detection
- (5) Graded management**
 - Isolation of the infested colony
 - Changing queen and combs of the slightly infested colony
 - Using Chinese herbs in the slightly infested colony
 - Burning severely infected colonies

Commonly used Chinese herbs



Honeysuckle
Flowers

Lonicera japonica

Folium isatidis
Leaves

Isatis tinctoria

Radix Isatidis
Roots

Strobilanthes cusia
Isatis tinctoria

Chrysanthemum
Flowers

Chrysanthemum ×
morifolium Ramat

Fructus Forsythiae
Shells

Forsythia suspensa

Hawthorn
Fruits

Crataegus
pinnatifida Bunge

Intructions: 50 g of the above Chinese herb(s) are boiled and mixed to 1 kg syrup.

Honey bees are fed with the above syrup.

3. Greater Wax Moth (*Galleria mellonella*)



Eggs

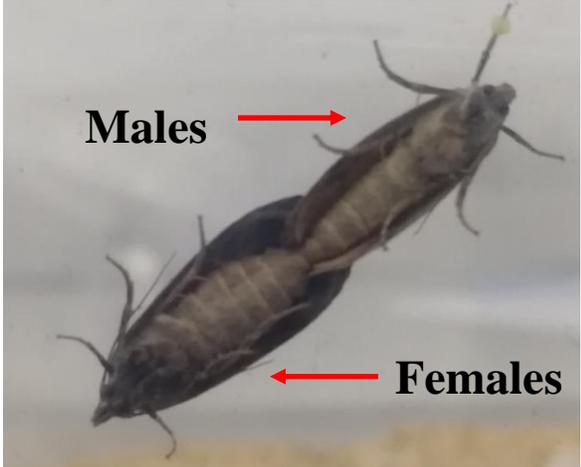


Instar	1	2	3	4	5	6	7	8
Length (mm)	2.44	3.81	5.04	8.61	12.42	18.82	21.71	22.98

Larvae



Pupae



Adults

Damage

- Weak colonies will be seriously damaged.
- Newly-hatched larvae feed on wax chips from the bottom of the hive.
- Larvae invade the comb, form silk-lined tunnels in the comb, and feed along tunnels.
- Bee larvae are destroyed by the greater wax moths, causing cells to shed their shells after pupation.
- The mature larvae pupate at the bottom corners of the hive or at the gap of the comb frame.



Control

- **Sanitary Cleaning:** Remove the residue wax chips from the hive regularly, keep the colony sanitation and clear up the old combs.
- **Fumigation:** The stored combs are fumigated using the glacial acetic acid.
- **Biological Control:** *Bacillus thuringiensis*.

Biological control may be better

Methods	Measures	Advantages	Defects
Colony Management	Strengthen the colony, eliminating the old comb keeping the bee farm sanitation.	Easy to implement Safety	Preventable but untreatable
Physical Control	High or low temperature	Effective	High equipment requirements Limited to stored combs Can not be applied in colonies
Chemical Control	Sulfur fumigation or insecticide	Fast effect Convenient to use	Limited to stored combs Contaminate the bee products
Biological Control	<i>Bacillus thuringiensis</i> (Bt)	Effective Safety	Not widely used



Effect of spraying the comb with Bt at lab after 4 weeks



Bt



Bt and synergist



Negative control



Bt treatment

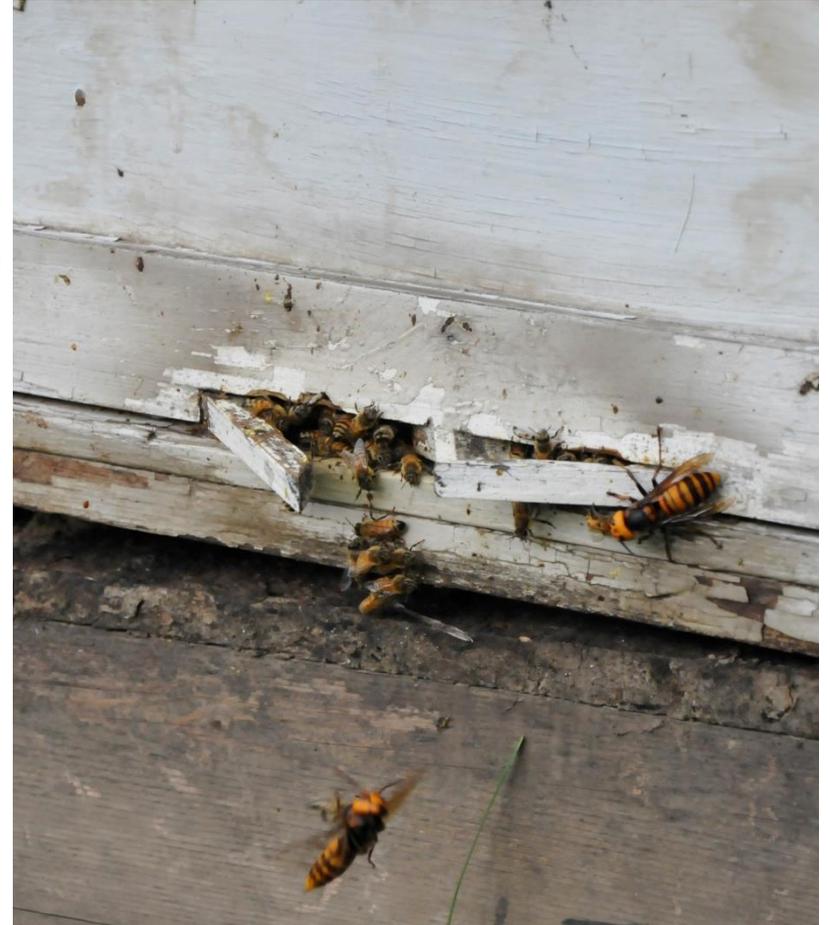
Effect of spraying the comb with Bt against the greater wax moth in hive

Bt trap



- ① **Prepare the bait:** the wax chips at the bottom of the beehive or old combs with a small amount of pollen and honey (the old comb need to be cut into small pieces) can be used as baits.
- ② **Spray the control solution on bait:** spray 2 to 3 times (shake well again before each spraying).
- ③ **Evaporate excess water and assemble:** put the bait into the trap-killing box, then **evaporate excess water** in the shade overnight, finally cover the cap.
- ④ **Place the Assembled trap-killing box at the bottom of the hive:** one box for each colony, and replace the bait every two months according to the above operations.

4. Wasps



Common wasps harmful to honey bees



Vespa mandarinia Smith



Vespa nigrithorax Buysson



Vespa ducalis Smith



Vespa affinis L



Vespa bicolor Fabricius



Vespa crabro

These figures were cited from Baidu.

Controls of waps

(1) Destroy the wasp's nest



(2) Hive entrance protection



(3) Entrapment

- **Container:** A slightly **larger mouth** for wasps to enter. The depth is about **10-15 cm**.
- **Prepare attractant:** Honey to water **3:1**. The depth of the diluted honey in the bottle is about **1 cm**, then a wasp is placed into the bottle.
- **Select location:** Place the bottle near the hive infested with wasps.
- **Replace attractant:** Diluted honey is usually replaced **once a day**.



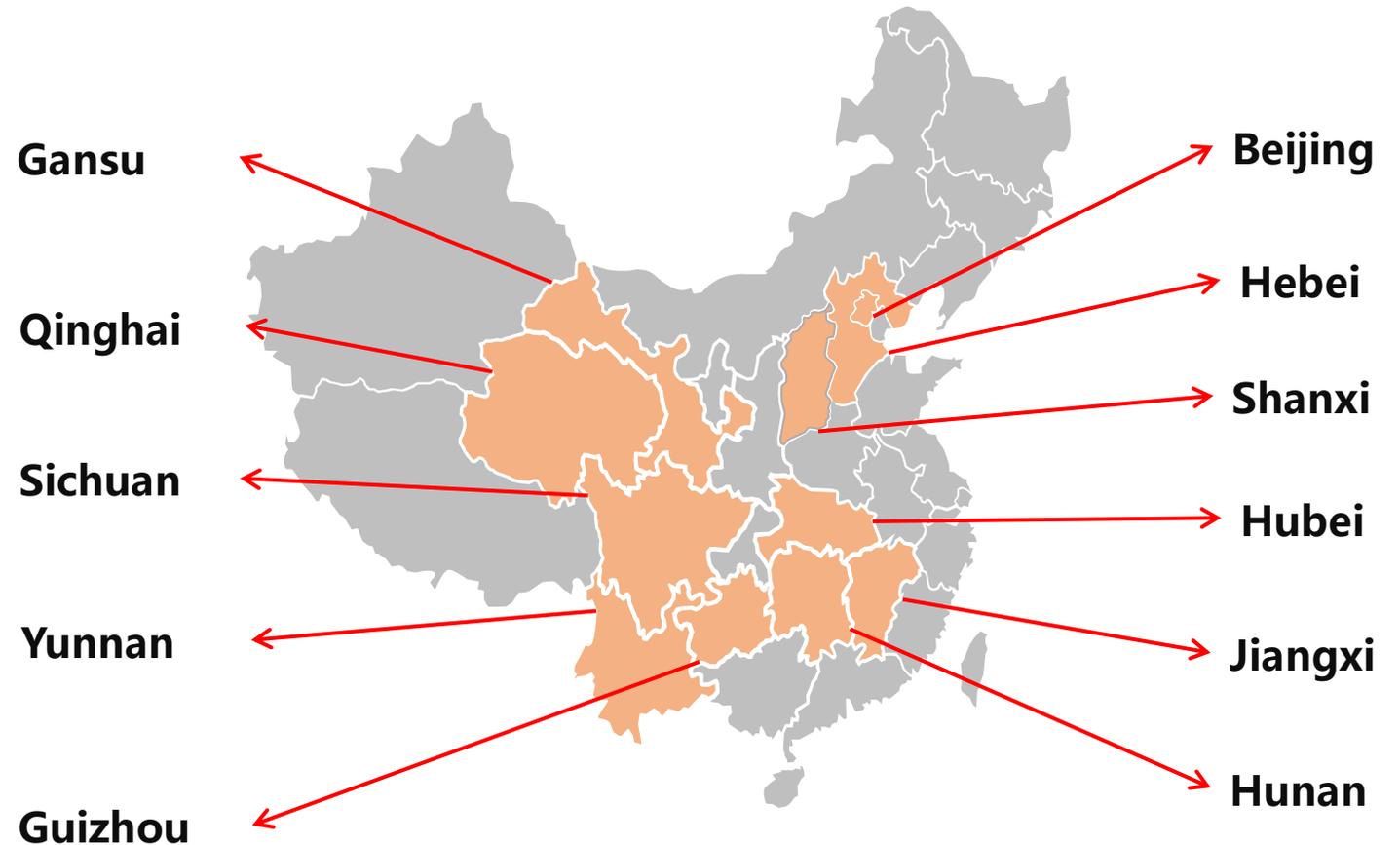
Part III

Examples of Biosecurity Measures for

***Apis cerana cerana* in China**

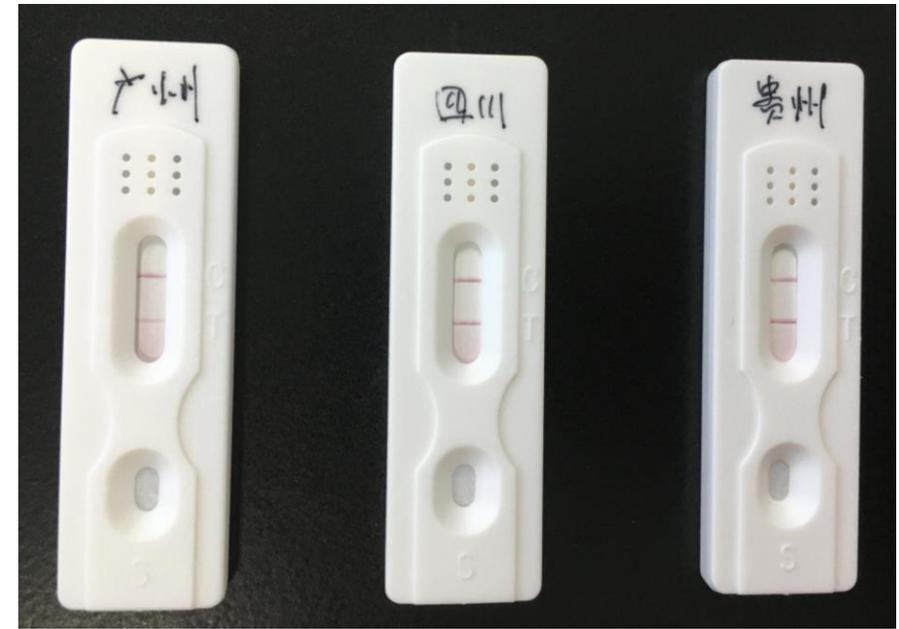
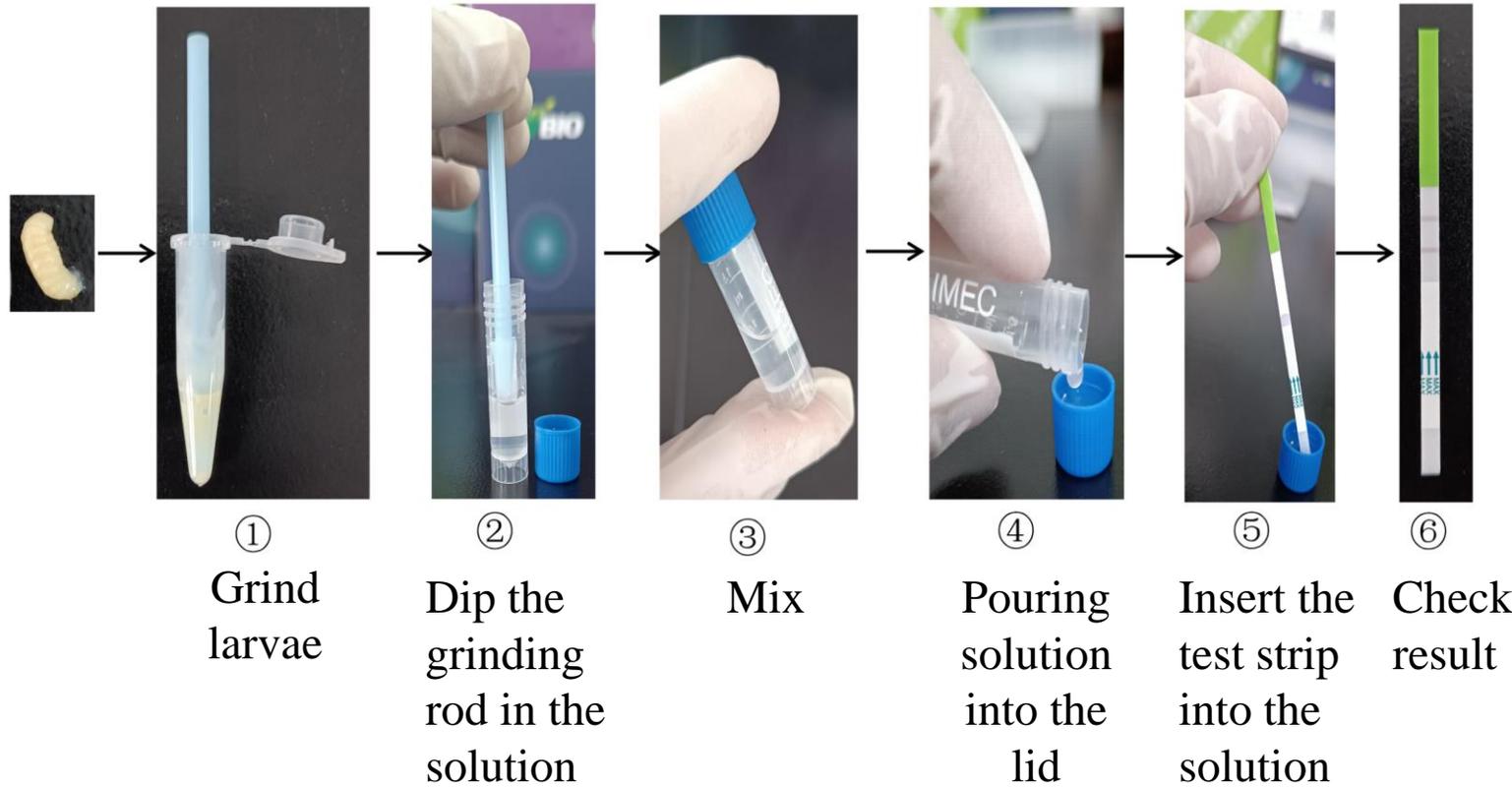
1. National pests surveillance of *Apis cerana cerana*

- Establishing monitoring points
- Testing samples once a month
- Providing control suggestions



2. Research and use of green control measures for pests of *Apis cerana cerana*

- **Rapid diagnosis of CSBV**
- **Control EFB with Chinese herbs**
- **Biological control of the greater wax moth with Bt**
- **Entrapment against wasps**



Rapid diagnosis of CSBV in 10 provinces



Prevention and control EFB with Chinese herbs in Hubei province



Prevention of greater wax moth with hive support in Shanxi and Hubei



① 加入1袋粉剂

① Add wettable Bt powder



② 加入1升冷水

② Dilute with water



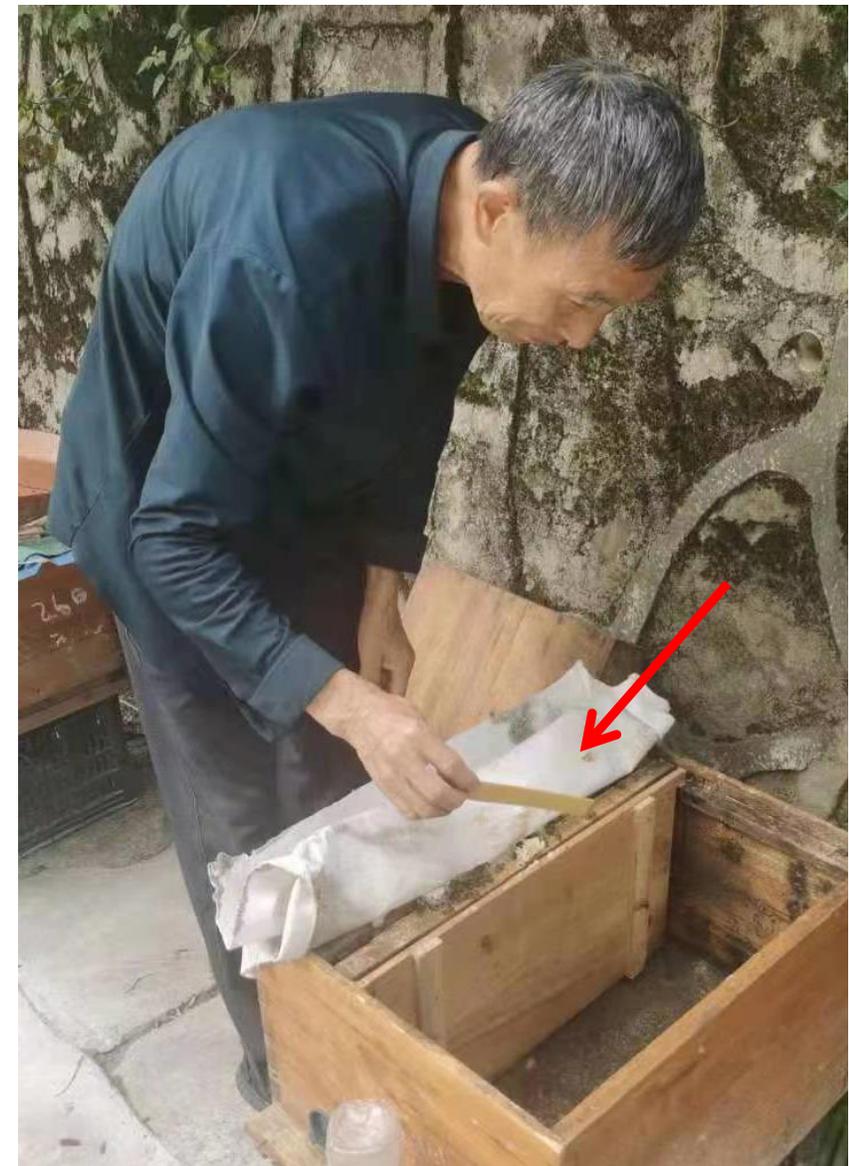
③ 添加1管增效剂

③ Add synergist

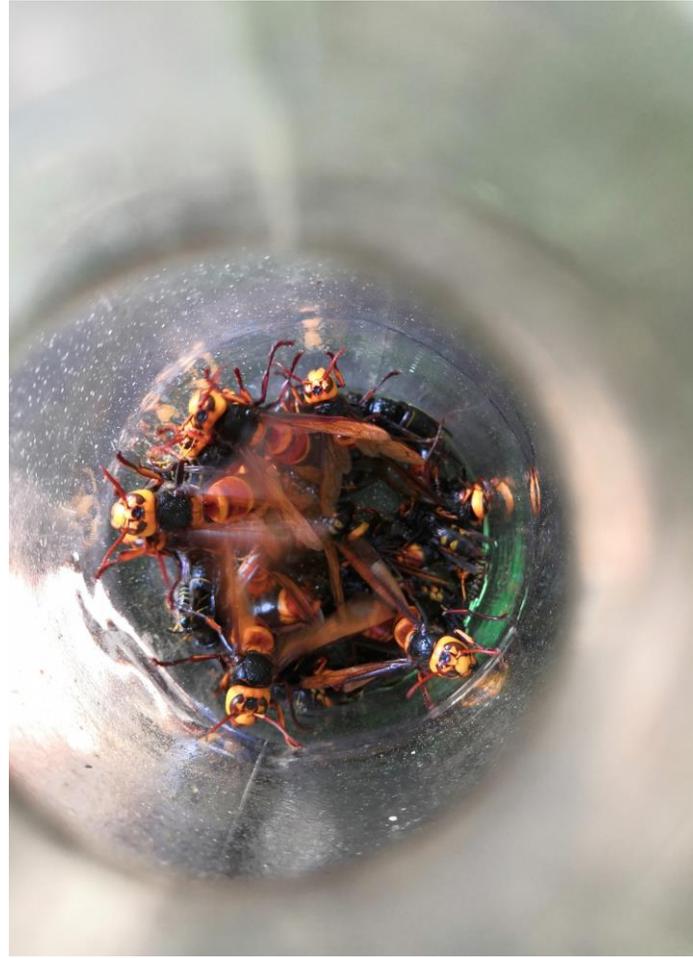


④ 充分摇匀

④ Spraying



Control of the greater wax moth with Bt trap in 12 provinces



Entrapment and hive entrance protection against wasps in Jiangxi Province

3. Technical training on honey bees biosecurity measures



Bee quarantine training for animal health supervision officers



**Training biosecurity
measures of pests to
beekeepers in China**



江西省科技特派团修水县养蜂技术培训班



Thank you for
your attention