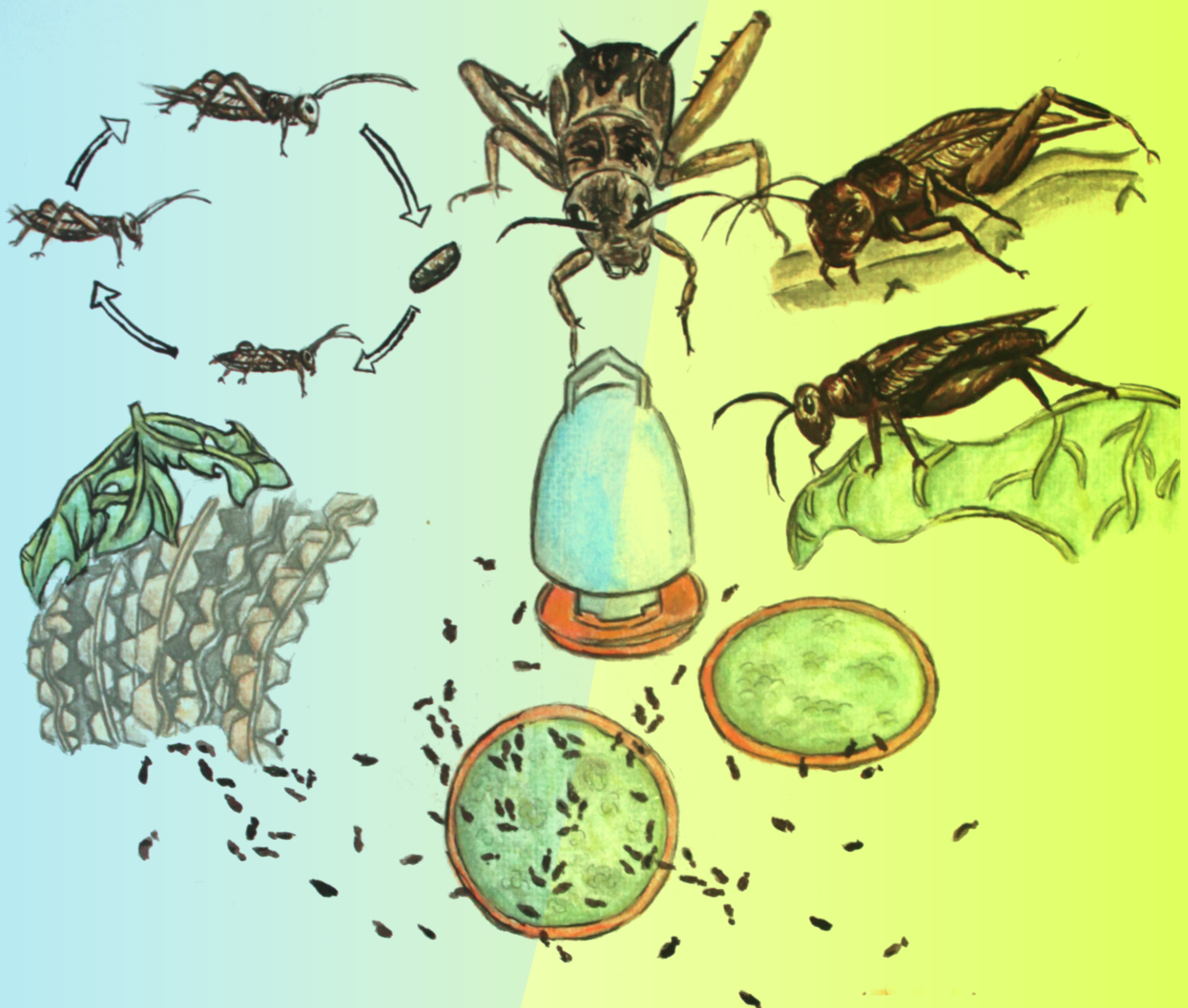




Cricket Production in Laos

Food from Locally Available Resources



Book Planning and Implementation

Objective : Raise awareness for a controlled and regular production of edible crickets, respecting the environment, the ecosystem, and biodiversity. This method is suitable for small scale farmers with low incomes.

Process:

- Phase 1 (2016 – 2017) > Experimental cricket breeding laboratory and pilot farm in Vientiane.
- Phase 2 (2018 – 2019) > Laboratory research extension with Lao villagers' participation, Thateng (Southern Laos)
- Phase 3 (2019) Publishing, printing, and dissemination for Income Generating Activities (IGA) in Laos.

Production: NGO OSC Dynamic Actions (DA), French Association of Sustainable Development, in partnership with the NGO Service Fraternel d'Entraide (SFE), in Laos.

Contributors:

- Laboratory : Damien DELAPLACE, Sarah STREIT, Charles JULIAN, Garance DANNER, David Jay SYDNEY, with technical advice from Tha LONKHOM.
- Design: Philippe & Brigitte AUREILLE, Damien DELAPLACE, Silvain DUPERTUIS, Dawn LEWIS – Layout: Silvain DUPERTUIS
- Illustrations : Joy SYDNEY
- Translation in lao : Thippachan PHANTHAKESONE,
- Translation in English: Dawn LEWIS.

Contact mail : dynamic@actions-laos.org

Copyright Dynamic Actions 2019

Printing: Lao Uniprint Press Co., Vientiane, RDP Lao
First Printing: November 2019

Self Publishing in Vientiane , 11/xx/2019
by Philippe AUREILLE.

This book is not for sale

This book is not for sale





Preface

Rational cricket farming: a simple, space-saving and fast way for Lao families to have regular access to protein, in both rural and urban areas. In a context such as Laos, where malnutrition remains a major problem, this type of livestock farming would benefit from being known and widespread.

This booklet is based on the wish to share our experience in the hope that others will go further in research and especially in the promotion of these techniques.

Thomas Nussbaumer
SFE Director, Laos

It is with great interest that we followed the experiments of cricket raising in food autonomy carried out by Dynamic Actions and SFE in Thateng. AVSF plans to disseminate these raising techniques in several provinces of Southern Laos, particularly in villages where the Nutrition Sensitive Agriculture component of the AHAN project is being implemented.

This booklet is an excellent resource that we will gladly distribute to the villagers with whom we work.

Gaylord ROBIN,
AVSF representative in Lao PDR





Table of contents

Book Planning and Implementation

- 2 Preface
- 3 Three Domesticated Cricket Species in Laos
- 4 Advantages of Breeding Crickets
- 5 Life Cycle: Ching Leed
- 6 Life Cycle: Chi Nai and Ching Kong
- 7 Steps in Cricket Raising
- 9 Cricket Shelter Design
- 14 Cricket Shelter Illustration
- 15 Protection from Predators
- 16 Cricket Watering Systems
- 17 Natural Cricket Food
- 18 Black Soldier Fly Larvae Production
- 19 Quantity of natural food for crickets
- 20 Nutritional Supplement for the Crickets
- 21 Precautions for successful breeding
- 22 Egg Laying and Harvesting
- 23 Cricket Harvesting and Preparation
- 24 Equipment Cleaning
- 25 Epilogue





Three domesticated Cricket Species in Laos



- 1. Domestic Cricket**
(*Acheta domesticus*) :
Ching Lee

Black or red, small, and easy to raise.
Shorter life cycle than other two species.



- 2. African Cricket**
(*Gryllus bimaculatus*) :
*Ching Kong

Larger, black, approximately the size of
a thumb. Approximately same life cycle
as Chi Nay.



- 3. Short Tailed Cricket**
(*Brachytrupes portentus*) :
Chi Nay

Largest, light red. Found in rice fields
but easy to raise domestically.

Sex

- Female (adult) differentiated by the ovipositor: a rear tube for burying eggs in the ground to protect them.
- Male (adult) differentiated by the stridulating organ (for chirping, attracting a mate).



Advantages of Breeding Crickets

Breeding techniques

- Easy to set up and operate
- Breeding cage easy to build
- Fast production: 2 to 3 months, depending on cricket species and slower if weather is cooler
- Low cost food, especially when it is produced with locally available ingredients
- Cricket breeding within reach of all socio-economic levels

Feeding

- Easy to find locally available ingredients, with addition of a cheap food supplement
- Food preparation simple to make
- The food offered for this type of farming is low cost compared to the use of chicken feed.
- Moreover, it is much more natural.

Economics

- Harvest can be sold on the local market
- High profitability for farmers

Nutrition

- Nutrition from crickets comparable to meat: protein, iron, lipids, calcium...



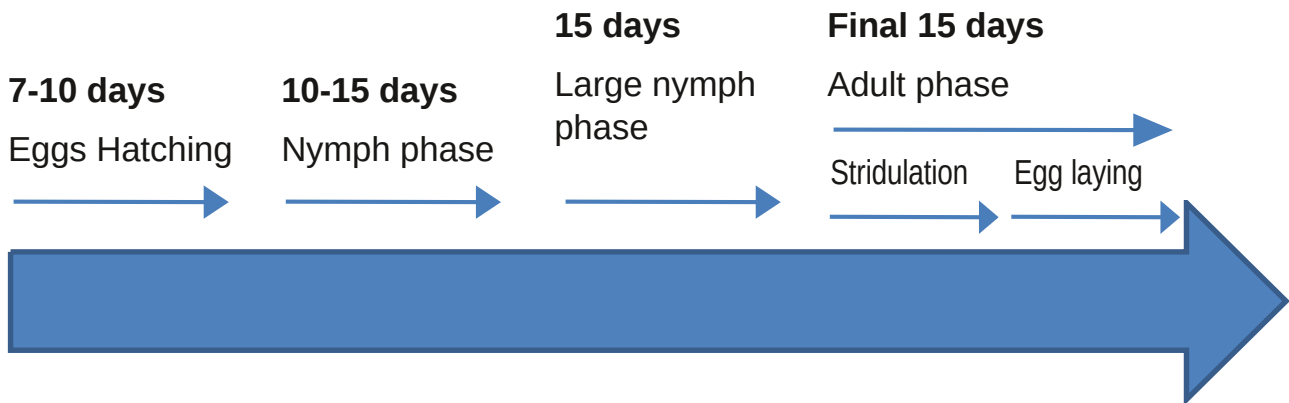


Life Cycle: Ching Leed




60 Days Life Cycle
Average temperature 30°C.

Maintaining 30°C is crucial, otherwise growth is slow and mortality risks are high. Ideal temperature range: 15 °C – 35 °C




Nymphs are small, fragile, and do not eat much.

The watering system during this phase should only be a damp cloth.


 Open water will drown the nymphs.

Crickets eat more and more

 They will cannibalize other crickets if they are malnourished or crowded.

Period of stridulation (songs)

This period lasts 5 days.

 Crickets will attempt to escape during this period

Egg laying period

At the end of this period, harvest the eggs (for future breeding) and the adults for consumption or sale.



Life Cycle: Chi Nai” and Ching Kong”

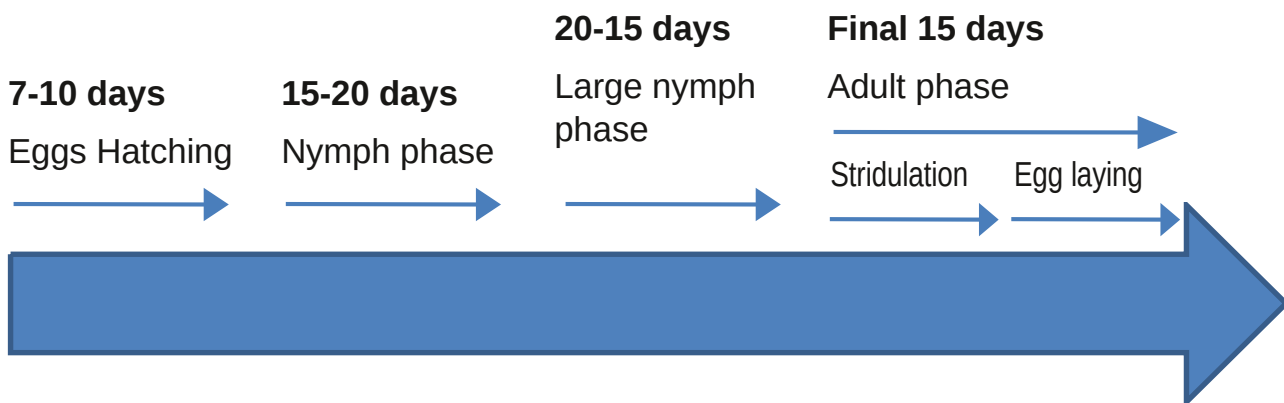


**Average temperature
30°C**

**75 Days
Life Cycle**



Cricket Production in Laos



Nymphs are small, fragile, and do not eat much. The watering system during this phase should only be a damp cloth. Open water will drown the nymphs.

Crickets eat more and more and will cannabalize other crickets if they are malnourished or crowded.

The period of stridulation (songs) lasts 5 days. Crickets will attempt to escape during this period. At the end of this period, harvest the eggs (for future breeding) and the adults for consumption or sale.



Moulting for all crickets : the cricket sheds its exoskeleton several times to let the crickets grow. After the final moulting, the genitalia and wings are fully developed.



Steps in Cricket Raising

1. Prepare cricket shelter

→ See Instructions on page 9



2. Black Soldier Fly Production

- One month before raising crickets, begin BSFL production
- See page 18 for details




3. Obtain eggs

- Eggs or small crickets can be obtained from villagers who already have a farm
- Alternatively, buy eggs or crickets at the market
- Generally 2 bowls of cricket eggs will populate a 1 m × 1.5 m cage.
- Maximum 700 crickets per cage, with an average density of 1 cricket/20 cm².



4. Prepare food

→ See Instructions on page 17 to 20

 High density of crickets will cause cannibalism. Be careful not to overpopulate the cricket cage



Steps in Cricket Raising (continued)

5. Raise crickets : Natural Cricket Food

→ See page 17 for details

6. Harvest the eggs (for future breeding)

→ See page 22 for details

7. Harvest adults for consumption or sale

→ See page 22 for details

8. Thoroughly clean cage

→ See page 24 for details

9. Repeat Steps in Cricket Raising



High density of crickets will cause cannibalism. Be careful not to overpopulate the cricket cage





Cricket Shelter

30°

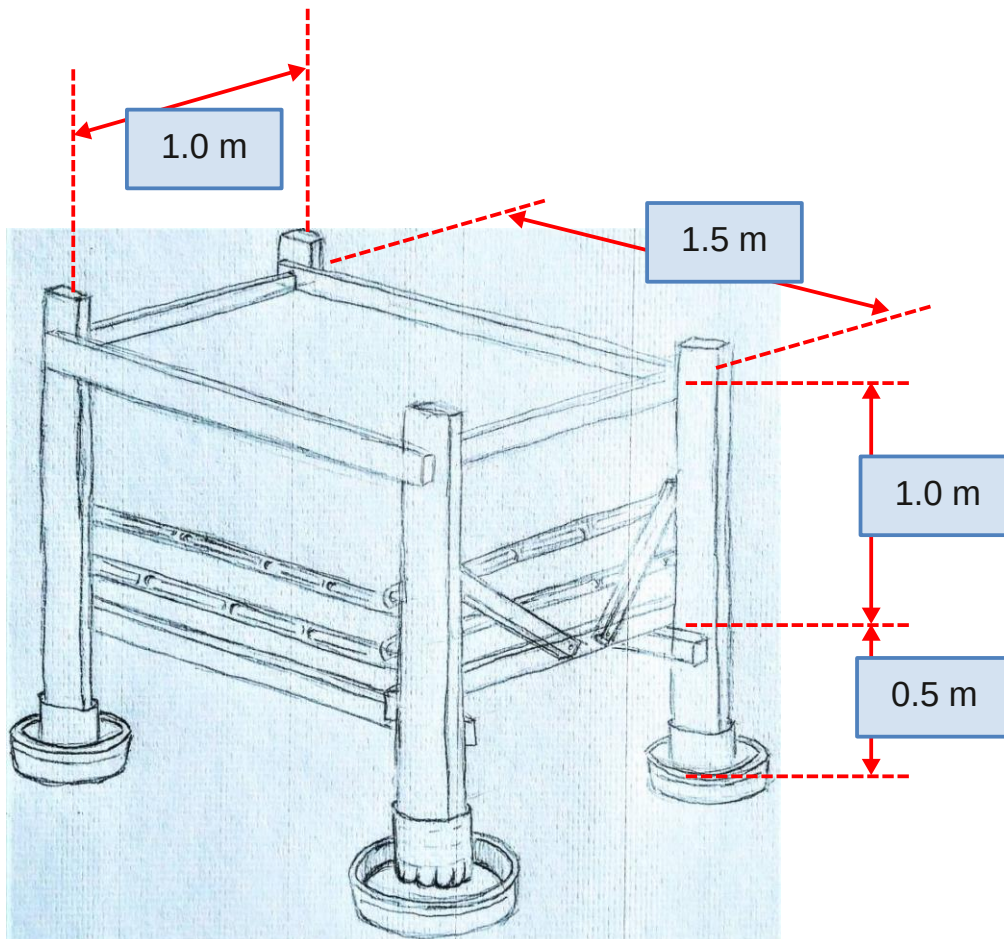
- Provide a shelter for cricket rearing that is protected from rain, sun and predators.
- The ideal average temperature is 30°C is crucial; watch for overheating under the protective sheet.



Place the cricket shelter in a place protected from thunderstorms and horizontal rain that could produce flooding.



Cricket Shelter Design (continued)



Required materials

1. Wood or bamboo
2. Plastic tarpaulin
3. Ropes
4. Single mosquito net
5. Staples or tape
6. 60 egg cartons
7. Rice husks
8. Sponges or rags
9. 6 bowls





Cricket Shelter Design (continued)

1. Build a frame (wood or bamboo)

1m × 1.5m × 1m

with legs 0.50m off the ground

to elevate the floor of the cage

2. Line the inside with the plastic tarpaulin



**Smooth and slippery walls
prevent crickets from climbing out.**





Cricket Shelter Design (continued)

3. Thoroughly **seal the walls** (tape or staple) to prevent any escape.
4. Press, then **staple or tape the outside edges** of the tarpaulin to secure it to the frame.




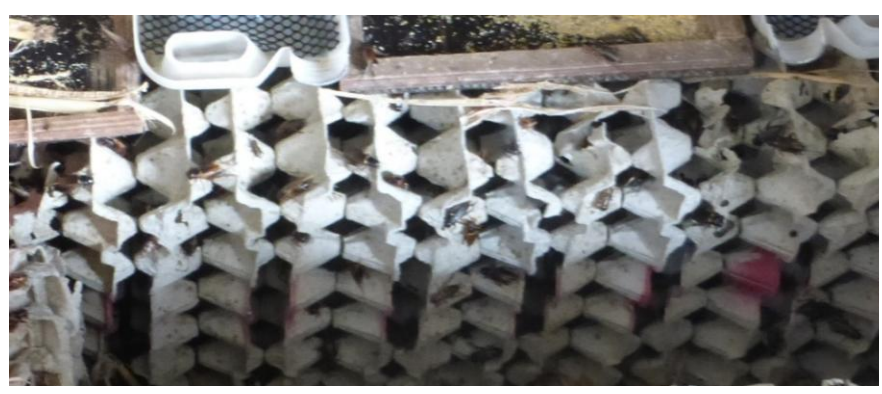
5. **Make a lid** with wood and mosquito net
6. **Fill the bottom** with 10 cm of rice husk.



Cricket Shelter Design (continued)

7. Arrange the **egg cartons** (30 cm x 30 cm) on their sides vertically.

 The more egg cartons, the less cannibalism will occur.



8. **Drinking water:** place a bowl containing a sponge or rags dipped in water (so the young crickets won't drown)
 → See page 16 for details



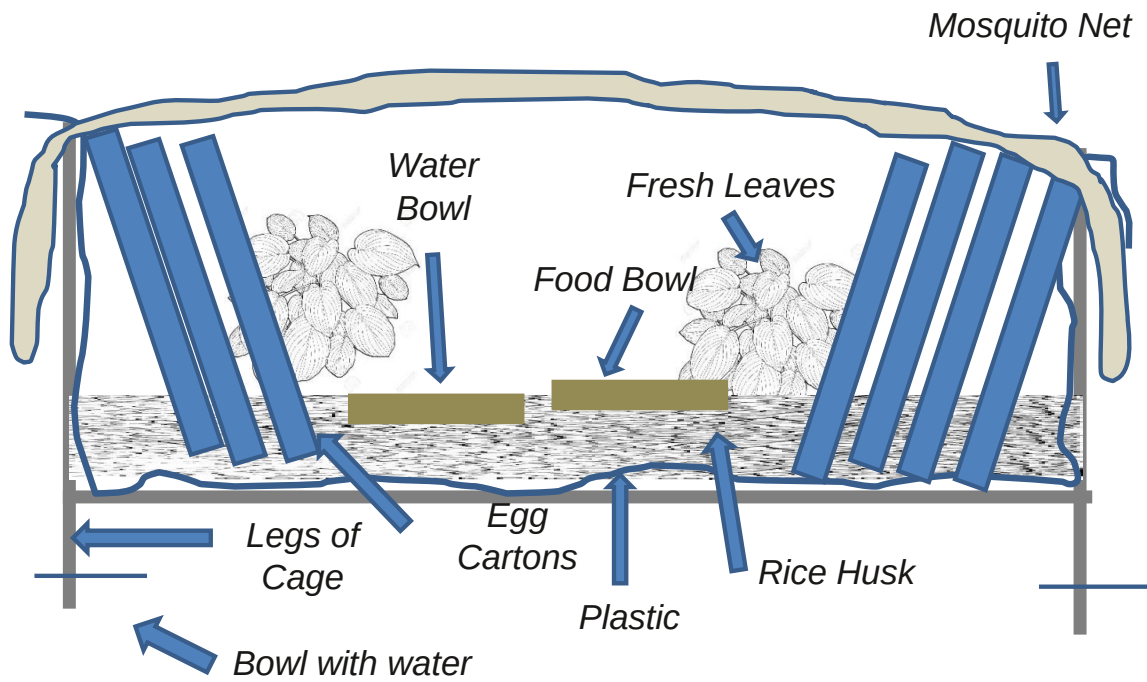
9. **Feeder:** Place a flat bowl in the cricket cage with food inside.

10. **Place feet of cage in bowls of water** to protect against ants.
 → See page 15 for details





Cricket Shelter Illustration



Be sure to place enough egg cartons (approximately 30). Hiding space deters cannibalism.

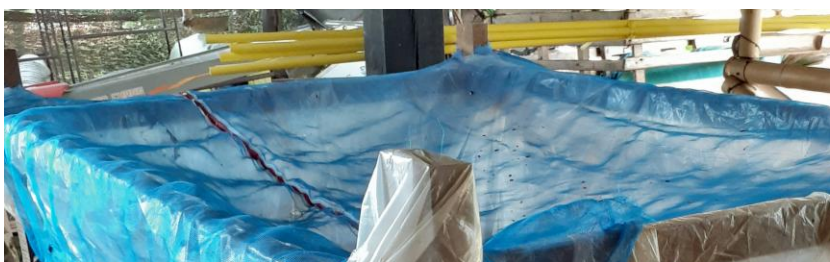




Protection from Predators

Different types of predators:

- **Ants:** very aggressive and deadly.
- Solution: Keep the feet of the cricket cage in water or engine oil.



- **Lizards, frogs, chickens, rats**
- Solution: Cover the cage with a mosquito net or tight cover, keep it closed effectively



When stocking the cricket cage, open the cage and place the lid on a table protected from ants.



Cricket Watering Systems

Young nymph stage

(Crickets less than 2 weeks old)

- Need a lot of moisture, but they can drown in open water. Their water must be given on a wet sponge or cloth soaked in water.



1 drop of water = 12 drowned crickets.



Large nymph stage

(crickets older than 2 weeks)

- Need a dry environment (for hygienic reasons). Place water in bowls or water containers.
- Water should always be clean: change the water daily (especially from 2 weeks on).
- Let tap water aerate (24 hours, for chlorine, if you use city water)





Natural Cricket Food



Recommended: Cricket food can be made from natural ingredients, easily found in Laos

Collect and Prepare Ingredients :

- **Black Soldier Fly Larvae (BSFL)**

→ See page 18 for details



- **Egg Shells**

→ Rinse and dry, then grind in to a powder.



- **Rice Bran**

→ Grind into a powder



- **Mung Beans**

→ Grind into a powder



- **Liquor Shot Glass for Measuring**

→ Etch 2 lines on glass to mark thirds

→ See page 19 for picture



- Purchase **Nutritional Supplement**

→ See Page 20 for details



Black Soldier Fly Larvae Production (for Natural Cricket Food)



Black Soldier Fly Larvae : BSFL

Crickets need to eat some meat. The BSFL is an appropriate food for crickets. The BSFL live naturally in Laos and are easy to produce. Females lay their eggs on food waste.

Step 1

- Prepare an **open container** for BSFL growth.
BSFL can be produced in a waste container or bucket, in a moist environment. Regularly add vegetable waste to harvest other larvae.



Step 2

- Continue adding **food waste**.
After about 1 month, the BSFL appear.

Step 3

- **Harvest BSFL** to make cricket food.
They are easy to harvest.



Step 4


- **Quicky boil BSFL**,
then dry for 2 days.

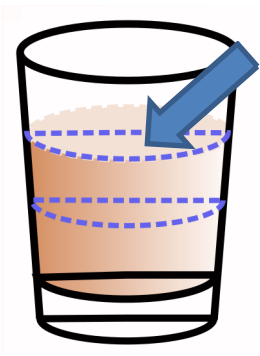
Step 5

- **Grind dried BSFL** into a powder

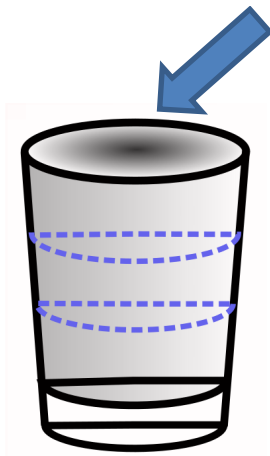


Quantity of natural food for crickets

 Measure using a liquor shot glass. Each 2 lines in the glass with a sharp nail to mark thirds

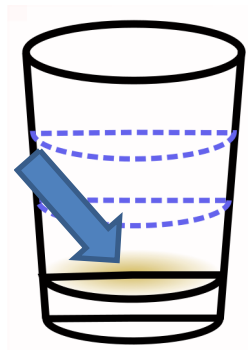


Rice Bran Powder:
 Fill to the top of the 2nd line (two thirds).

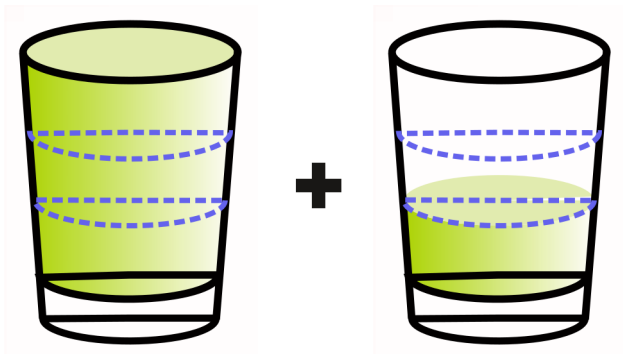


BSF Larvae Powder:
 Fill to overflowing.

Egg Shell Powder:
 cover just barely to bottom of the glass.



Mung Bean Powder:
 Fill one glass full to the brim and one more to the one third mark.



Salt:
 Just a pinch



Nutritional Supplement for the Crickets

In addition to homemade cricket feed, purchase and add an affordable and commercially available supplement



Contains:

Vit A, Vit D3, Vit B1, B2, B6, B12, Ascorbic Acid, Menadione, Nicotinamide Folic Acid, D-Panthenol, Aspartic Acid, Threonine, Sarine, Gluconic Acid, Proline, Glycine, Alanine, Cystine, Valine, Methionine, Isoleucine, Leucine, Phenylalanine, Tyrosine, Lysine, Histidine, Arginine



Why?

In order to grow and thrive, crickets need a variety of trace nutrients. The commercially available supplement provides all the hard to replicate nutrients that the crickets need to thrive.



Add 5 drops of food supplement to the water with each water renewal, at least once a week.



Precautions for successful breeding

- Place the cricket eggs in a cricket cage that you have previously built.
- Make sure the watering system and natural food are correct.



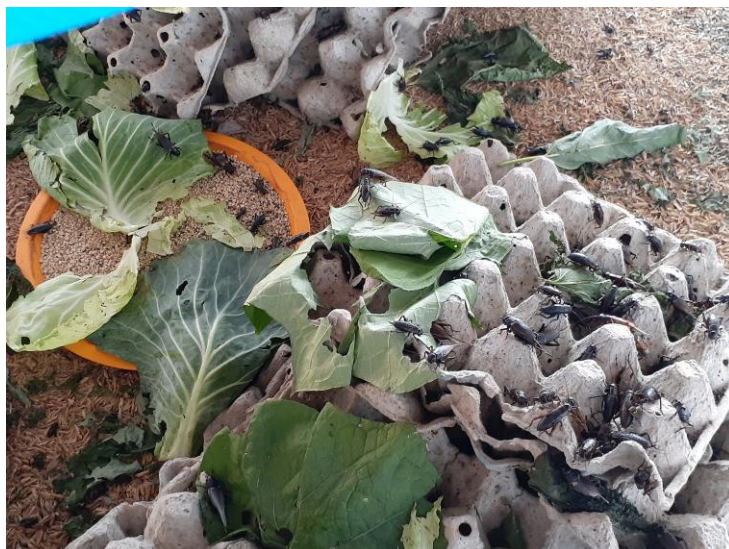
Daily Monitoring

- 7 days per week until mature
- Monitor the amount of food
- Add fresh leaves every day
- Maintain 30°C ambient temperature
- Monitor moisture and if necessary add water or moisten watering cloth



Check the cleanliness of the cage:

- Remove fresh food not consumed in 1 day
- Clean feeders and water bowls
- Make sure there is no access to the cage of predators such as ants, lizards, rats, etc.





Egg Laying and Harvesting

Egg Laying Bowls

Make 3 or 4 special bowls for the crickets to lay eggs. Prepare each bowl with loose and moist material such as soil, burnt rice husks, and sand. Egg laying begins after the song phase. After the song phase:

1. Leave the Egg Laying Bowl for 3 days in the breeding box.
2. Check the humidity of the material regularly. It should continue to be moist but not wet.
3. After 3 days, collect the bowls for the next generation of cricket raising.
4. Place the bowls in a well protected space, away from ants and other predators, preferably at 30°C.
5. After harvesting the eggs, feed the crickets only plants for 24 hours. Then harvest the crickets for consumption.

New Cycle

Egg hatching of the new eggs will take place between 8-10 days after harvest. Place the Egg Laying Bowls in a clean and prepared cricket cage before the eggs start hatching.





Cricket Harvesting and Preparation



Harvest Mature Crickets

- Rinse with clear water
- Scald live, then boil 5 min
- Store in a plastic bag or container in the fridge (maximum 3 days) or in the freezer for up to one month

Cook

- Remove from refrigerator or freezer, place in frying pan and a few spoons of oil.
- When fried, add salt to taste.
- For a special flavor, add a few lemongrass leaves while frying.





Equipment Cleaning

- All equipment must be emptied and cleaned between each breeding cycle.
- Expose all parts to the sun after cleaning to sanitize well.
- Pay special attention to egg cartons: Dust and leave them in the sun 8 hours minimum on each side.
- Plan to replace the egg cartons after 3 cricket cycles





Epilogue

With its partners in Laos, the NGO "Dynamic Actions" (DA) realizes and monitors actions of Co-Sustainable Development:

- Education
- Food Security
- Sanitation - Hygiene (WASH)

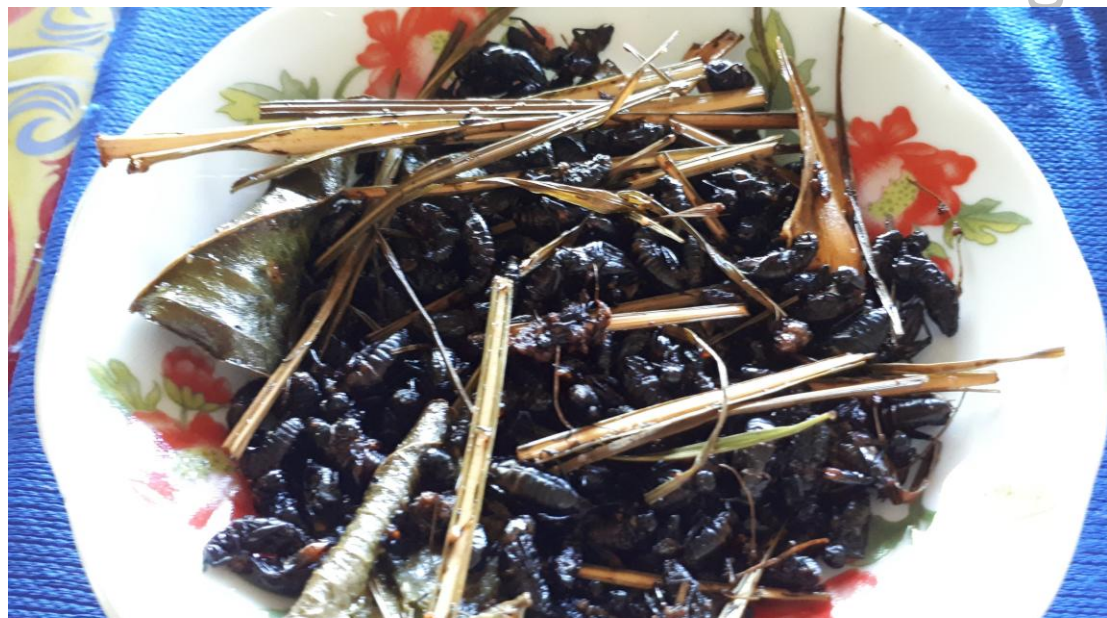
This booklet is part of the actions related to "Food Security" in Laos, associated with the field "Education". It also contributes to the development of a sustainable local economy.

Edited with the contribution of the NGO SFE, the content aims to raise awareness of growing crickets with food based on local ingredients.

If you want to contribute to the actions, you can donate to the association: "Dynamic Actions" via the website: <https://actions-laos.org>

Any donation will be assigned to one of the current projects.

For further information, please contact us at dynamic@actions-laos.org





Cricket Production in Laos Food from Locally Available Resources

This booklet is an aid to the development of cricket farming, on a family scale and in near financial autonomy, without the need to use chicken feed. The data presented are based on biological and bio-sourced rations, which are adapted to the local capacities and resources of Laos. This type of low-cost livestock farming is simple to set up and develop, and it is within the reach of all.

The NGO Dynamic Actions, in cooperation with its partners and Lao breeders in Laos, conducted research and experiments on breeding crickets from 2016 to 2019.

These farms represent alternative nutritional solutions, less expensive and less polluting, for populations who need to enrich their diet with an energy supply of protein. To produce the same amount of protein, crickets need six times less feed than cattle and half as much as pigs and chickens.

The method proposed in the booklet is based on these results.

A first collection on the theme of “Responsible beekeeping in Laos” was published in 2013.

These booklets are part of the support dynamic for villagers in rural and agricultural areas and contribute to the development of Income Generating Activities (IGAs).



Philippe Aureille
 Dynamic Actions President

© Dynamic Actions 2020
This book is not for sale

