# Grasshopper Eating Hibiscus Bud

Engineering Challenge

Life Science | Engineering Design Process

## Visible Elements in Photo

- A green grasshopper with long hind legs, antennae, and textured body positioned on a plant stem
- A dark red/maroon flower bud (appears to be hibiscus) partially enclosed in green sepals
- Green leaves and stems supporting both the insect and flower
- The grasshopper's mouth oriented toward the bud, suggesting active feeding
- Thin, curled tendrils extending from the stem structure

## Reasonable Inferences

- From the grasshopper's positioning and bud: The insect is actively feeding on or damaging the developing flower, suggesting that plants need protection from insect herbivores to produce flowers and seeds.
- From the bud structure: The layered green sepals already provide some barrier; this hints that natural structures can offer partial defense but may need reinforcement.
- From the plant stem's delicate appearance: Thin-stemmed plants are vulnerable to both feeding damage and the weight of climbing insects, implying support and protection mechanisms are necessary.

## Engineering Task

### K-2 Challenge:

Design a cozy cage or cover for a flower bud that keeps grasshoppers away but still lets sunshine and rain reach the flower. What materials can you stack, wrap, or weave to make a bug-proof shield?

### 3-5 Challenge:

Design a protective barrier for a flowering plant bud that must:
- Keep grasshoppers unable to reach the flower for at least 10 days
- Allow at least 70% of sunlight to pass through
- Not damage or squeeze the tender bud
- Be built from natural or recyclable materials at minimal cost

Test your design by placing it near an actual plant or simulating insect contact. Measure sunlight penetration and document any wear after 5 days.

## EDP Phase Targeted

Ask / Define Problem

This photo shows a clear real-world challenge: plants are being damaged by herbivores. Students begin by asking Why does this plant need protection? and What would happen without it? before moving to solutions. The visible problem drives curiosity and makes the design task relevant.

## Suggested Materials

- Cheesecloth or netting scraps
- Toilet paper tubes or paper towel tubes
- Dried grass, straw, or raffia
- Small plastic cups or clear containers (yogurt cups)
- Twist ties, twine, or fabric strips

## Estimated Time

- K-2: 45–60 minutes (design + simple construction + observation)
- 3-5: Two 40-minute sessions (design planning + build + test + redesign iteration)

## Why This Works for Teachers

This task directly addresses NGSS K.ETS1.1 / 3-5.ETS1.1 (Ask questions, make observations, and gather information about a situation people want to change) by anchoring design in a visible biological need—pest damage—that students can observe, measure, and solve through prototyping.