

鳳梨旺 To Know 「Pineapple Want To Know」

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一、旨趣 Purpose：

台灣農業栽培技術世界第一等，身為鳳梨達人的你，請回答鳳梨冷知識，並進入互動遊戲，挑出正確品種的鳳梨。遊戲畫面右上會有一個知識庫充電站，介紹有性生殖、無性生殖、基因轉殖的特色。

Taiwan's farming skills are one of the best in the world! You are a "Pineapple Master". Can you answer some fun pineapple facts and pick the right kind of pineapple in the game? Look at the Knowledge Power Station on the top right corner of the screen.

It will tell you about:

Sexual Reproduction: plants grow from seeds.

Asexual Reproduction: plants grow from cuttings or parts of the plant.

Genetic Modification (GM): using science to change plant genes.

二、活動規劃 Activity Plan：

回答鳳梨冷知識問題 & 平板體驗鳳梨互動遊戲

Answer Pineapple Fun Facts & Play the Pineapple Interactive Game on the Tablet!

鳳梨互動遊戲網址 Game Website

<https://2024ntnu.netlify.app/pineapple/>

<遊戲方式說明 Game Instructions>

<進入遊戲>

- 1.輸入玩家名稱，按下 **stat** 鍵開始遊戲。
- 2.移動滑鼠按右鍵來切水果。
- 3.間隔十秒變化一次題目。

<How to Play>

1. Enter your player name and press the **Start** button.
2. Move the mouse and **right-click to cut fruits**.
3. Every 10 seconds, the question/topic changes.

<遊戲規則>

題目為**無性生殖**

切到跟鳳梨媽媽一樣外觀的鳳梨 @冠芽鳳梨寶寶@裔芽鳳梨寶寶@吸芽鳳梨寶寶 就加分，切到跟鳳梨媽媽不同外觀的鳳梨或是其他水果就扣分。

題目為**有性生殖**、**基因轉殖**

切到跟鳳梨媽媽不同外觀的鳳梨 @種子鳳梨寶寶 @基因轉殖鳳梨寶寶 就加分；
切到跟鳳梨媽媽一樣外觀的鳳梨或是其他種水果就扣分。

<Game Rules>:

Asexual reproduction (vegetative propagation):

- Cut the pineapples that **look the same as the mother pineapple**:
 - Crown pineapple baby
 - Sucker pineapple baby
 - Slip pineapple baby**→ You gain points!**
- Cutting pineapples that **look different** or other fruits
→ lose points.

Sexual reproduction or Genetic modification:

- Cut pineapples that **look different from the mother pineapple**:
 - Seed pineapple baby
 - Genetically modified pineapple baby**→ You gain points!**
- Cutting pineapples that **look the same as the mother** or other fruits
→ lose points.

三、活動內容 Activity Content :

回答鳳梨冷知識問題 Answer Pineapple Fun Facts

Q1: What is pineapple in English?

Hello friends! Do you know what “鳳梨” is in English?

It's pineapple!

Look! It looks like a pine cone, and tastes sweet like an apple.

(中文：哈囉朋友們！你知道鳳梨的英文是什麼嗎？是 pineapple！它看起來像松果，味道像蘋果一樣甜。)

Q2: Why do Taiwanese people say pineapple means “good luck”?

In Taiwan, pineapple sounds like “wàng lái.”

It means “good luck comes!”

(中文：在台灣，鳳梨聽起來像「旺來」，意思就是「好運來」)

Q3: Is pineapple one fruit?

No! It's many little fruits together!

Each “eye” is one tiny fruit.

(中文：鳳梨不是一顆果實，而是很多小果子擠在一起的聚合果。每個小眼睛都是一顆小果子。)

Q4: Where are pineapple flowers and seeds?

Each flower makes one tiny fruit, and they join to be one big pineapple.

Sometimes you can find small black seeds inside.

(中文：每一朵小花會變成果子，最後合在一起變成大鳳梨。有時候你會在裡面看到黑色的小種子。)

Q5: Which side of pineapple is the "head"?

The "head" is the side without the green leaves!

(中文：沒有綠色葉子的那一端就是鳳梨頭。)

Q6: Why does pineapple sometimes hurt your tongue?

Because it has pineapple enzyme (bromelain) that breaks down protein—even on our tongue!

(中文：因為鳳梨有鳳梨酵素，會分解蛋白質，連舌頭上的蛋白質也會分解。)

Q7: Why does meat become soft with tenderizer?

Tenderizer has enzymes like papaya and pineapple enzymes. They break down proteins in meat!

(中文：嫩精有木瓜酵素、鳳梨酵素，可以分解肉裡的蛋白質，所以肉會變軟。)

Q8: Why no pineapple milk?

Pineapple enzyme breaks the protein in milk, making it bitter and curdled!

Show: Watermelon milk, Papaya milk. Ask: “Who is missing?”

(中文：因為鳳梨酵素會分解牛奶蛋白，產生苦味，還會結塊。展示西瓜牛奶、木瓜牛奶，問：少了誰呢？)

平板體驗鳳梨互動遊戲 Play the Pineapple Interactive Game on the Tablet!

無性生殖是指親代產生子代的過程中，不需雌雄個體參與，沒受精作用，藉由細胞複製的方式，直接產生新個體。子代與親代遺傳特性相同，繼承親代所有遺傳訊息。種子植物可以透過（1）營養器官繁殖（例如鳳梨的冠芽、裔芽、吸芽等）、（2）組織培養來實現無性生殖（如下圖）。

Asexual reproduction: (As shown in the figure below)

- The parent produces offspring **without male or female gametes**—no fertilization needed.
- Offspring are **genetically identical** to the parent.
- In pineapples, asexual reproduction happens via:
 1. **Vegetative organs:** crown, suckers, slips
 2. **Tissue culture**

Images for Asexual reproduction:

1. Vegetative organs propagation: Crown pineapple | Sucker pineapple | Slip pineapple
2. Tissue culture: Tissue-cultured pineapple

(1)營養器官繁殖 Vegetative organs



冠芽鳳梨

Crown

裔芽鳳梨

suckers

吸芽鳳梨

slips

(2)組織培養 Tissue culture



組織培養鳳梨

Tissue culture

有性生殖是指透過生殖細胞（配子）結合的一種生殖方式，子代具有較多的遺傳差異。例如種子繁殖（如右圖）。

Sexual reproduction: (As shown in the figure on the right)

- Offspring are produced by the fusion of **gametes (sex cells)**.
- Offspring have **more genetic diversity**.
- Example: Seed propagation (Seed pineapple)

種子鳳梨 Seed



基因轉殖是將原本沒有的遺傳物質轉殖入活細胞或生物體，產生基因改造（遺傳差異）的相關技術。

- Scientists **insert new genes** into a living cell or organism.
- This creates **genetically modified pineapples** with new traits.
- Example: Genetically modified pineapple.

基因轉殖鳳梨GM



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