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The Pea Family (Fabaceae)

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The Pea Family (Fabaceae)

Practice: 8 MCQs

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1. What is the pea family?

1.1 Family membership differs from crop use

Fabaceae is the plant family that includes peas, beans, groundnut, horse-gram and soybean. Members of this family are called legumes.

Leguminosae is an accepted alternative name for the same family. The two names do not describe separate families.

A plant family groups related plants. Everyday food labels describe how people use their harvests. These two ways of grouping plants need not match.

Three crops to recognise

Common name	Scientific name	Family
Groundnut, or peanut	Arachis hypogaea	Fabaceae
Horse-gram	Macrotyloma uniflorum	Fabaceae
Soybean	Glycine max	Fabaceae

Groundnut is an oilseed crop, but it remains a legume. Soybean also belongs to Fabaceae despite its use for oil. Horse-gram belongs to the same family.

Other familiar members include beans, peas, lentils, chickpeas and clovers.

True or False: Groundnut, horse-gram and soybean all belong to Fabaceae.

Sources:

- Kew: Fabaceae
- Botanical Code: family names
- FAO: legumes and pulses
- Kew: groundnut
- Kew: horse-gram
- Kew: soybean
- FAO: grain legumes and oil legumes

2. What does a legume pod contain?

2.1 A fruit surrounds its seeds

A typical legume fruit is a pod containing seeds. The pod wall surrounds the seeds; the pod and seed are different structures.

Picture a pea pod opened along its length. The round peas inside are seeds. The surrounding case forms the fruit wall.

Pod structure varies across Fabaceae. Some pods split open at maturity, while others remain closed. Therefore, every legume need not resemble a familiar green pea pod.

Sources:

- Kew: Fabaceae
- NC State: peanut

3. Why is groundnut an unusual example?

3.1 Underground pods remain fruits

Groundnut flowers develop above ground, while its pods develop below ground. Underground fruit development is called **geocarpy**.

After fertilisation, a structure called a peg grows down into the soil. The pod then develops underground.

The peanut inside the shell is a seed. Its shell is the pod wall. Growing underground does not make the peanut a root or tuber.

True or False: A groundnut is a root because its pod develops underground.

Sources:

- NC State: peanut
- Kew: peanut fruit development

4. Are all legumes pulses?

4.1 Harvest stage changes the crop category

Legume identifies the plant family; pulse identifies a narrower crop category. In agricultural classification, pulses are legumes harvested for their dry edible seeds.

Dry beans, lentils and chickpeas are familiar pulses. Soybean and groundnut are grouped as oilseed crops rather than pulses in this classification.

Green peas harvested fresh belong to the vegetable category. Dried peas belong to the pulse category.

The plant remains a legume in either case. Harvest stage and crop use explain the classification difference.

True or False: Every legume crop is classified as a pulse.
Sources:

- FAO: legumes and pulses
- FAO: pulse definitions

5. What happens inside root nodules?

5.1 Bacteria fix nitrogen using plant energy

Root nodules are small growths that house bacteria in many legumes. These bacteria are collectively called **rhizobia**.

Nitrogen fixation converts nitrogen gas into a form that living cells can use. In this partnership, bacteria perform the conversion inside nodules.

Nitrogen gas is written as **N_2**. The bacteria convert N_2 into ammonia, written as **NH_3**. The plant uses the fixed nitrogen to build nitrogen-containing substances, including proteins.

The plant supplies carbon compounds made through photosynthesis. These compounds provide energy for the bacterial partnership.

Both partners benefit, so the relationship is a form of **mutualism**. Saying that legumes fix nitrogen is shorthand for this plant–bacterium partnership.



Root nodules on a clover plant. Many legumes house nitrogen-fixing bacteria inside nodules. Photo: Bwiltz / Wikimedia Commons, CC BY-SA 4.0.

True or False: Plant root cells perform the nitrogen-fixing reaction without bacteria.

Sources:

- New Mexico State: nitrogen fixation
- Minnesota: legume characteristics
- FAO: biological nitrogen fixation

6. Does every legume fix nitrogen?

6.1 Compatible bacteria and conditions matter

No. Nodulation and nitrogen fixation are not universal across Fabaceae. Some legume lineages do not form nitrogen-fixing nodules.

Even a nodulating crop needs compatible, effective bacteria. Drought, unsuitable temperatures and nutrient shortages can reduce fixation.

A family name therefore cannot guarantee nitrogen fixation in a particular field. Avoid treating nodules as the sole test for identifying Fabaceae.

Sources:

- Comparative phylogenomics of root-nodule symbiosis
- Nodulating and nonnodulating legume genomes
- FAO: biological nitrogen fixation
- New Mexico State: nitrogen fixation

7. How can legumes help the next crop?

7.1 Retained residues affect the next crop

Crop rotation means growing different crops in sequence on the same land. Legumes can contribute nitrogen to a rotation, but the benefit is conditional.

Fixed nitrogen first supports the growing legume. Some nitrogen becomes available in soil when retained plant material decomposes.

Harvested seeds or removed forage carry nitrogen away from the field. The following crop therefore does not receive all the nitrogen fixed earlier.

For example, a legume grown as green manure leaves plant material to decompose in the field. Removing much of the crop leaves less material behind.

The benefit depends on fixation, crop growth, harvest removal and residue management. Planting a legume does not automatically restore every soil nutrient.

True or False: Harvesting legume seeds can remove nitrogen from the field.

Sources:

- New Mexico State: nitrogen fixation
- Minnesota: legume characteristics
- FAO: legumes and pulses
- Crop rotation

9. Apply the family distinction

9.1 Identify all three plants

Groundnut, horse-gram and soybean all belong to the pea family. Therefore, a question listing these three plants has three Fabaceae members.

Sources:

Questions learners often ask

Why can a crop be both an oilseed and a legume?

Legume identifies a botanical family. Oilseed describes an agricultural use. Groundnut and soybean fit both descriptions.

Does Leguminosae mean an outdated, invalid family name?

No. Leguminosae and Fabaceae are accepted alternative names for the same family.

Why does a legume supply energy to its bacterial partner?

Nitrogen fixation requires energy. The plant supplies carbon compounds produced through photosynthesis to support the bacterial process.

Will any rhizobium work equally well with every legume?

No. Compatibility and effectiveness vary between plants and bacterial strains. Their partnership also depends on growing conditions.

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Practice MCQs

1. Which botanical family name is an accepted alternative to Leguminosae?

A. Fabaceae

B. Malvaceae

C. Poaceae

D. Solanaceae

See answer ↓

2. How many of these crops belong to Fabaceae: groundnut, horse-gram and soybean?

A. Only one

B. Only two

C. None

D. All three

See answer ↓

3. Which pair contains legumes classified as oilseed crops rather than pulses?

A. Lentil and chickpea

B. Chickpea and dry pea

C. Dry pea and dry bean

D. Groundnut and soybean

See answer ↓

4. In a legume root nodule, which partner converts nitrogen gas into ammonia?

A. Nitrogen-fixing bacteria

B. The pod wall

C. The leaf epidermis

D. The seed coat

See answer ↓

5. Which statement about Fabaceae is correct?

A. Every species forms nitrogen-fixing nodules

B. Some family members do not form nitrogen-fixing nodules

C. Nodulation proves identical fixation rates in every field

D. All rhizobia work equally well with every legume

See answer ↓

6. Why can harvesting a grain legume reduce the nitrogen left for the next crop?

A. Seeds contain no nitrogen

B. Nitrogen leaves the field in harvested seeds

C. All fixed nitrogen stays permanently in root nodules

D. Harvest converts soil nitrogen into sunlight

See answer ↓

7. What does the plant mainly provide to support its nitrogen-fixing bacterial partners?

A. A supply of ready-made animal proteins

B. Nitrogen gas manufactured by the leaves

C. Carbon compounds made through photosynthesis

D. Fully formed seeds for every bacterium

See answer ↓

8. Which statement correctly distinguishes fresh green peas from dried peas?

A. Fresh peas are not legumes

B. Drying changes the botanical family

C. Both must be oilseed crops

D. Fresh peas are vegetables; dried peas are pulses

See answer ↓

Answer Key

1. **A.** Fabaceae and Leguminosae are accepted alternative names for the pea family. The other options name different plant families. Leguminosae is not an invalid name merely because Fabaceae is also used. ↑ Q1
2. **D.** All three crops belong to Fabaceae. Their scientific names are Arachis hypogaea, Macrotyloma uniflorum and Glycine max, respectively. Groundnut and soybean remain legumes despite being oilseed crops. ↑ Q2
3. **D.** Groundnut and soybean are oilseed legumes in this agricultural classification. Lentils, chickpeas, dry peas and dry beans are pulses. Botanical family membership and agricultural crop categories describe different features. ↑ Q3
4. **A.** Rhizobia inside the nodule perform nitrogen fixation. The plant provides carbon compounds that support the process. Pod walls, seed coats and leaf epidermal cells are not the nitrogen-fixing partner. ↑ Q4
5. **B.** Nodulation is not universal across Fabaceae. Compatible, effective bacteria are needed for a nodulating crop to fix nitrogen successfully. Growing conditions also affect fixation, so neither universal nodulation nor identical field performance follows from family membership. ↑ Q5
6. **B.** Legume seeds contain nitrogen that supported their growth. Removing the seeds carries that nitrogen away. Retained plant material can return nitrogen during decomposition, but the next crop does not receive every unit fixed earlier. ↑ Q6
7. **C.** The plant supplies photosynthesis-derived carbon compounds that provide energy. The bacteria use energy while converting nitrogen gas into ammonia. The partnership does not involve plant manufacture of nitrogen gas or direct delivery of animal proteins and seeds. ↑ Q7
8. **D.** Both remain legumes. Fresh green peas belong to the vegetable crop category, while dried peas belong to the pulse category. Harvest stage changes the agricultural grouping without changing the plant family. ↑ Q8

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