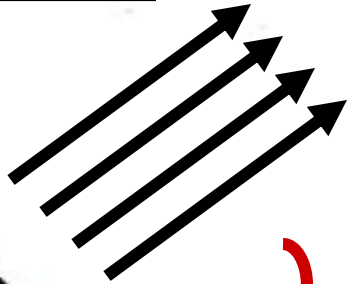


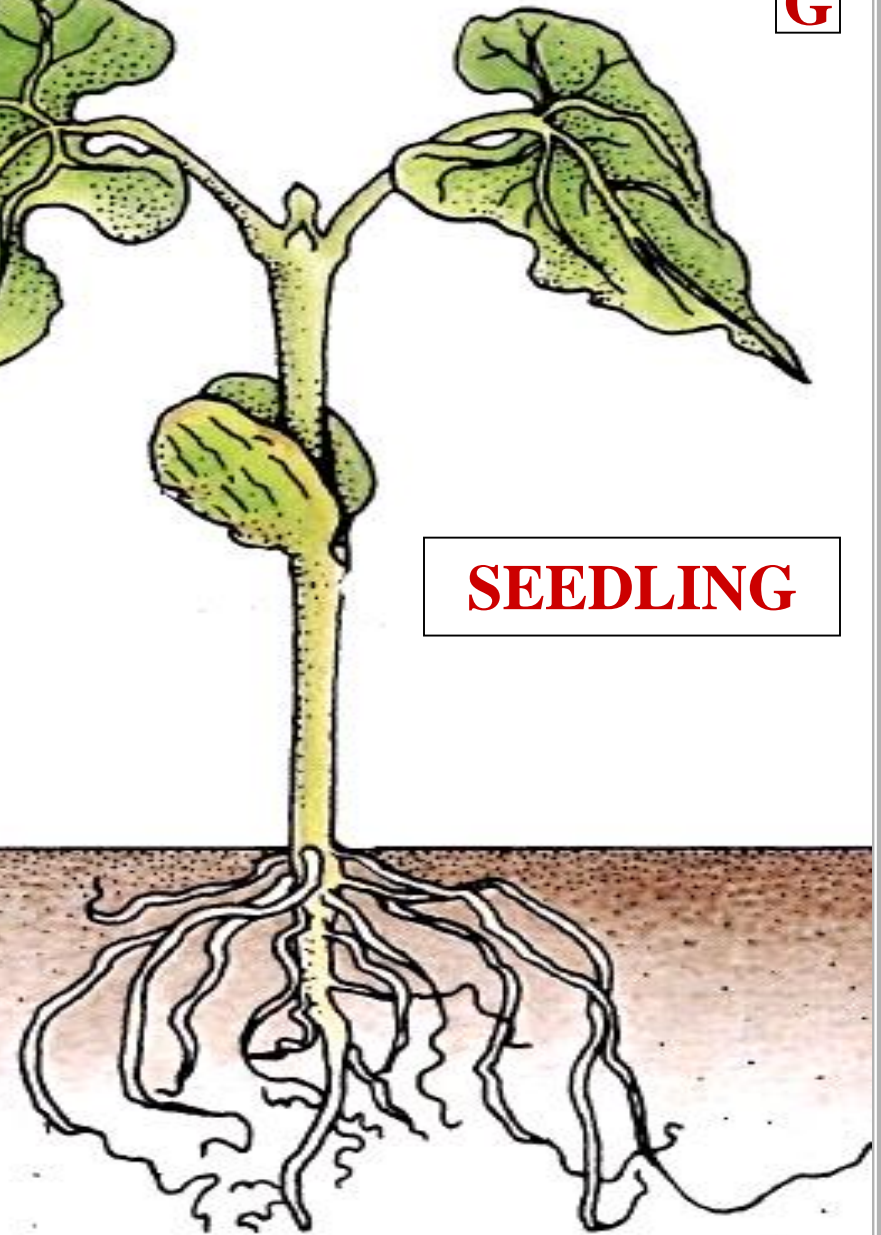
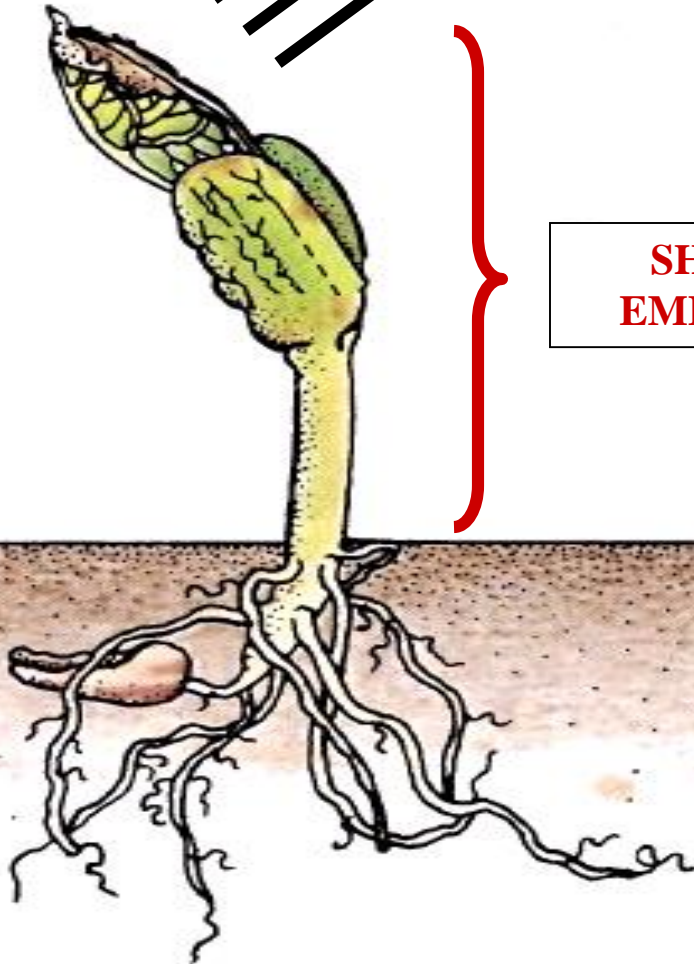
**NEGATIVELY
GEOTROPIC**

G

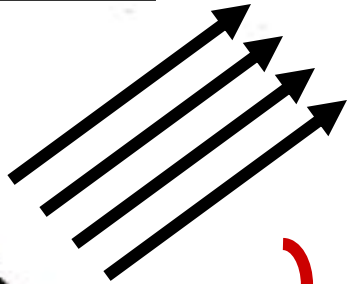


**SHOOT
EMERGES**

SEEDLING



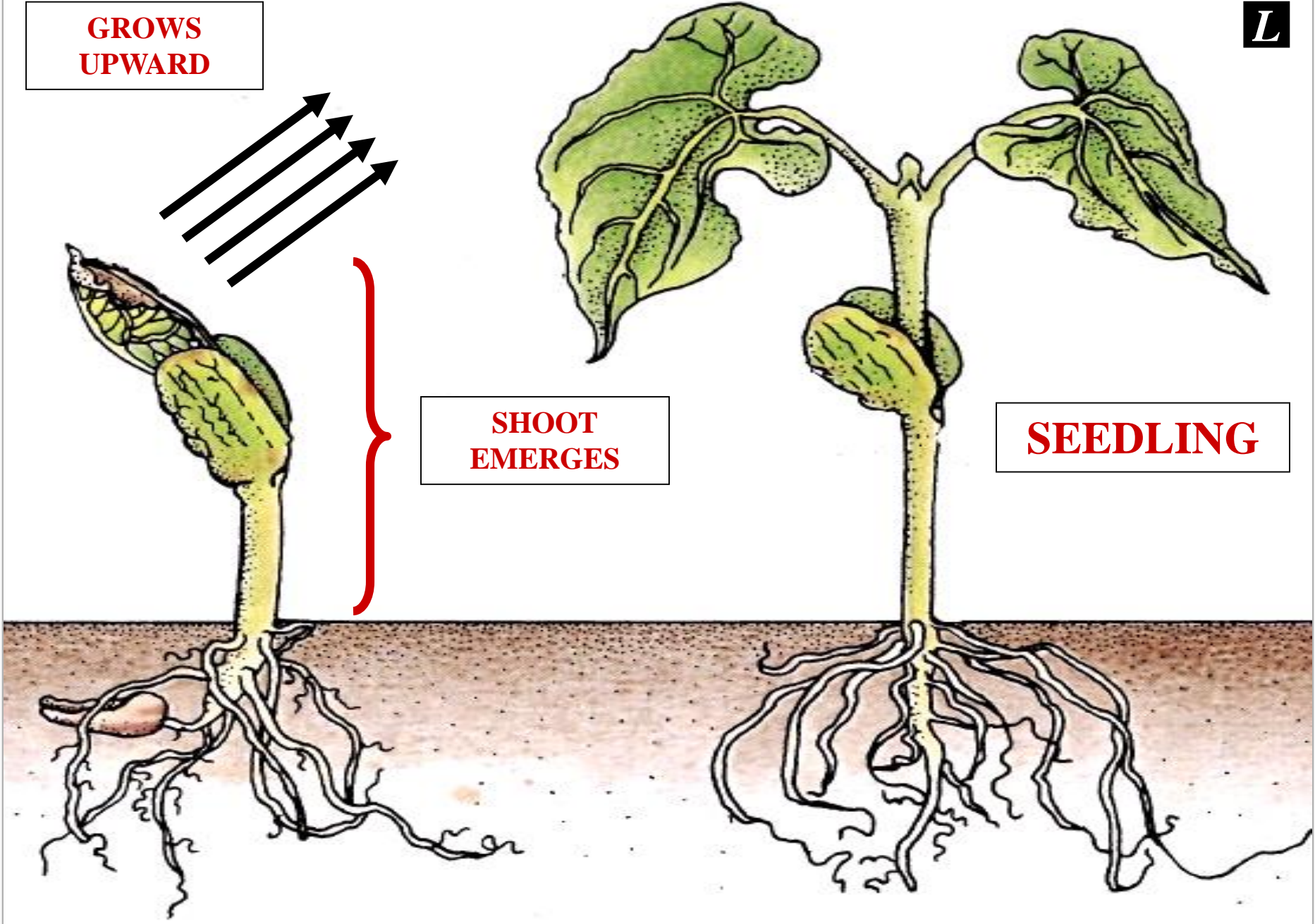
GROWS UPWARD



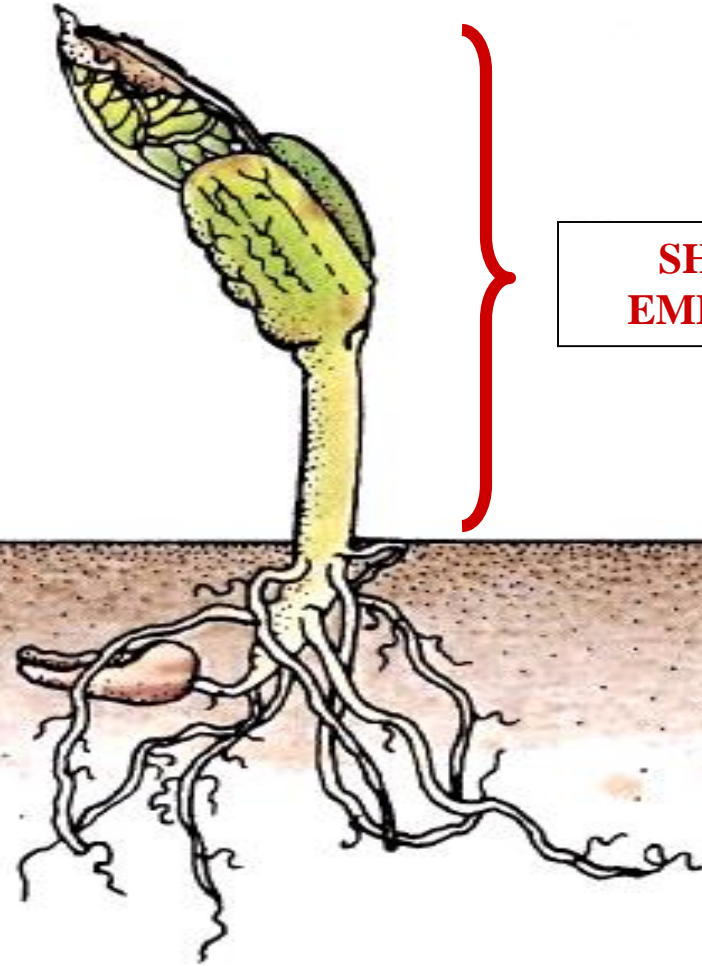
SHOOT EMERGES



SEEDLING



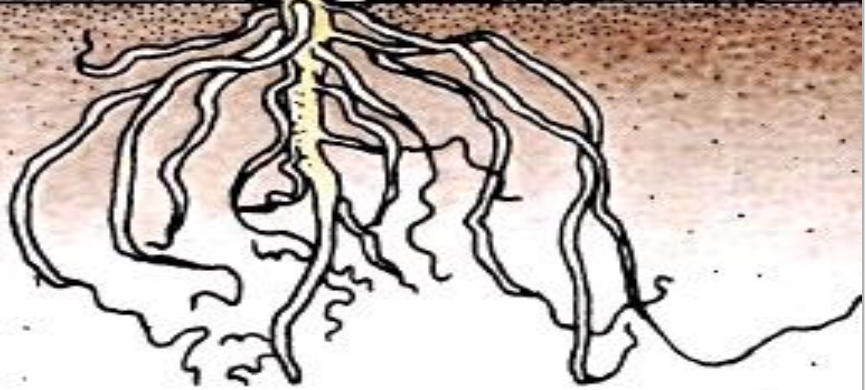
LIGHT ENERGY



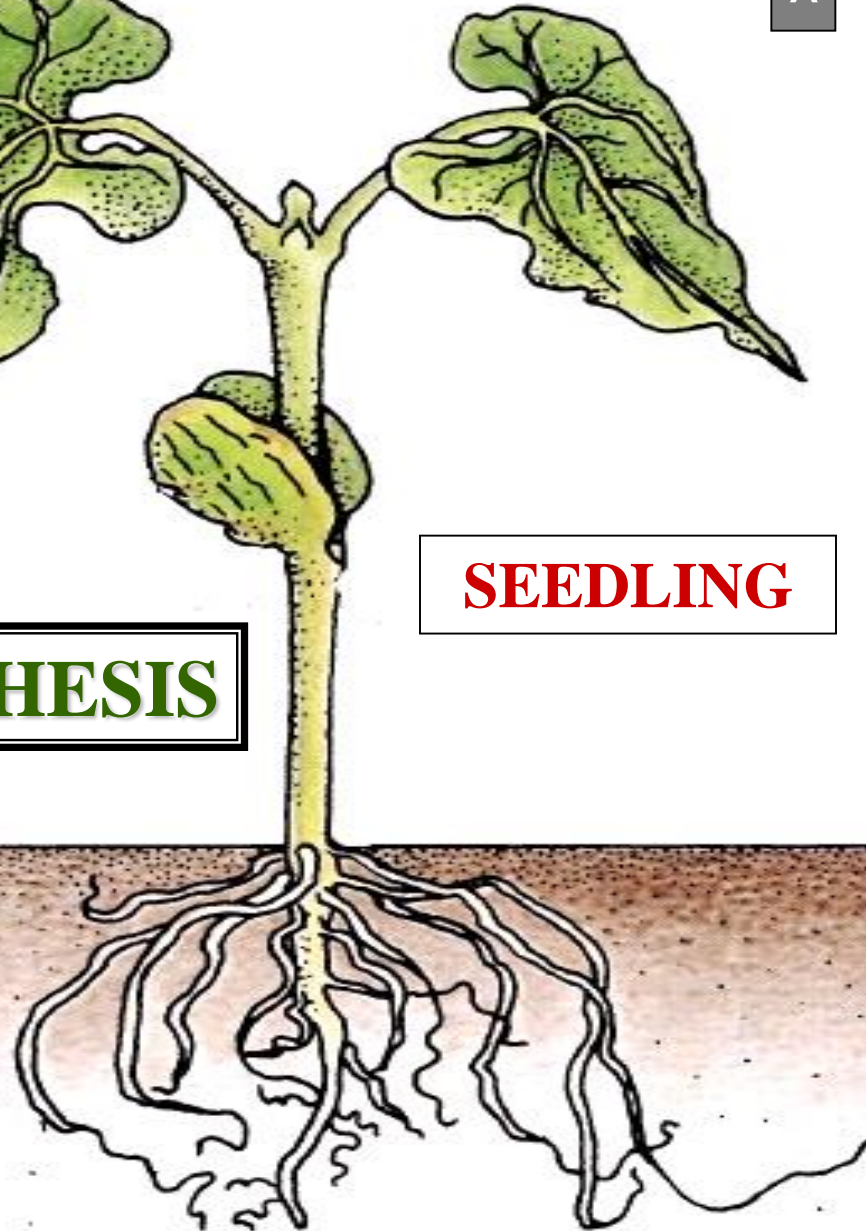
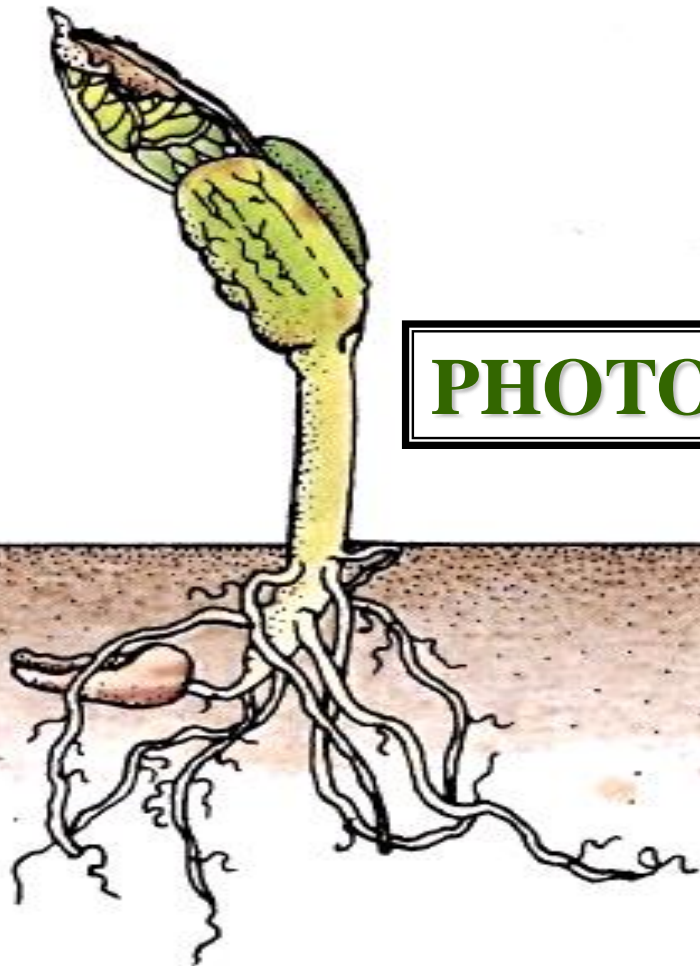
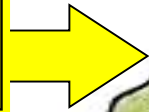
**SHOOT
EMERGES**



SEEDLING



LIGHT ENERGY



PHOTOSYNTHESIS

SEEDLING

GERMINATION TYPES

GERMINATION TYPES

EPIGEAL

GERMINATION TYPES

GERMINATION TYPES



EPIGEAL
HYPOGEAL

GERMINATION
TYPES

EPIGICAL GERMINATION

EPIGEAL GERMINATION

EPIGEAL GERMINATION



**COTYLEDONS
EMERGE FROM SEED**

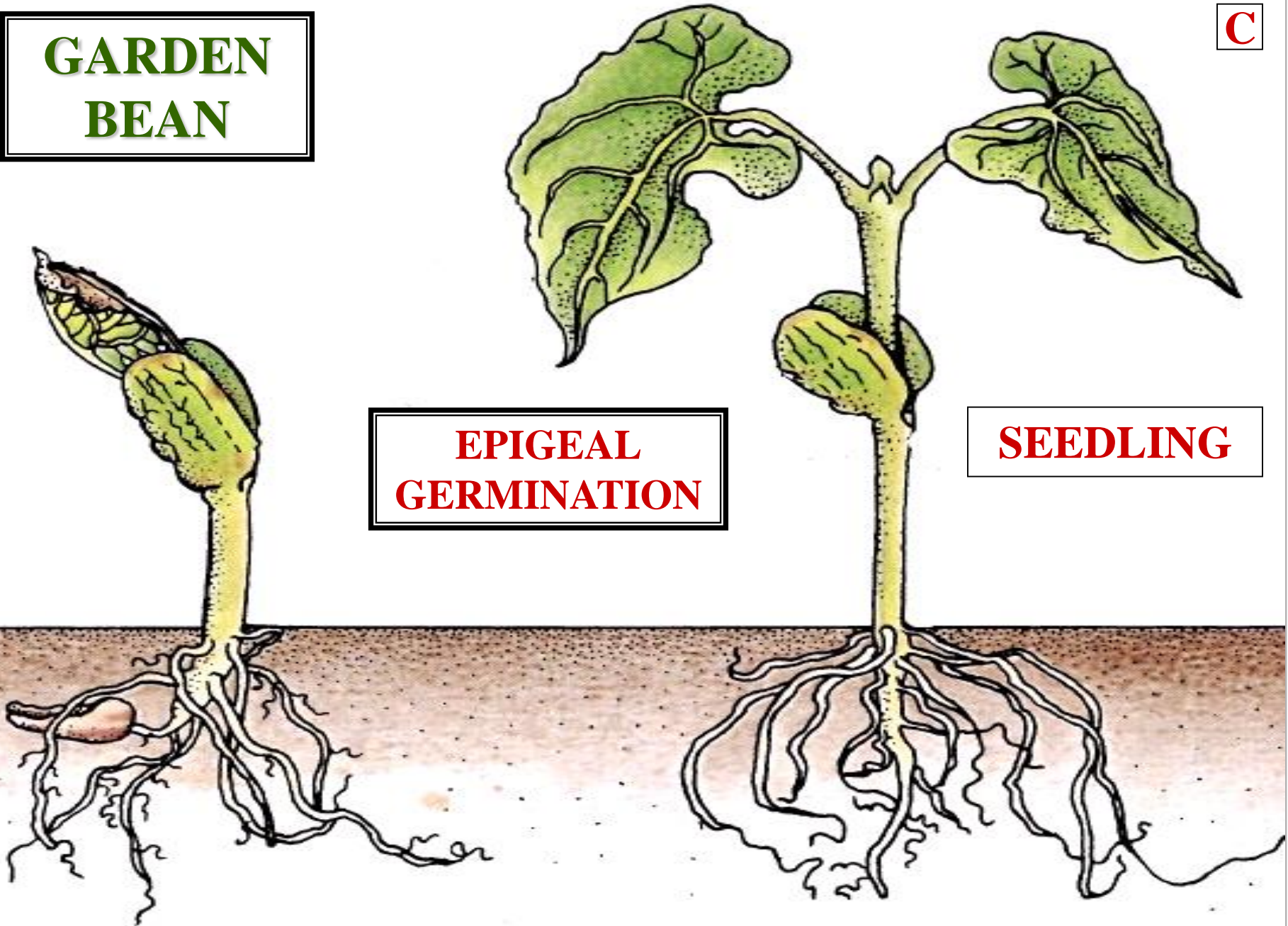
EPIGEAL GERMINATION

GARDEN BEAN

C

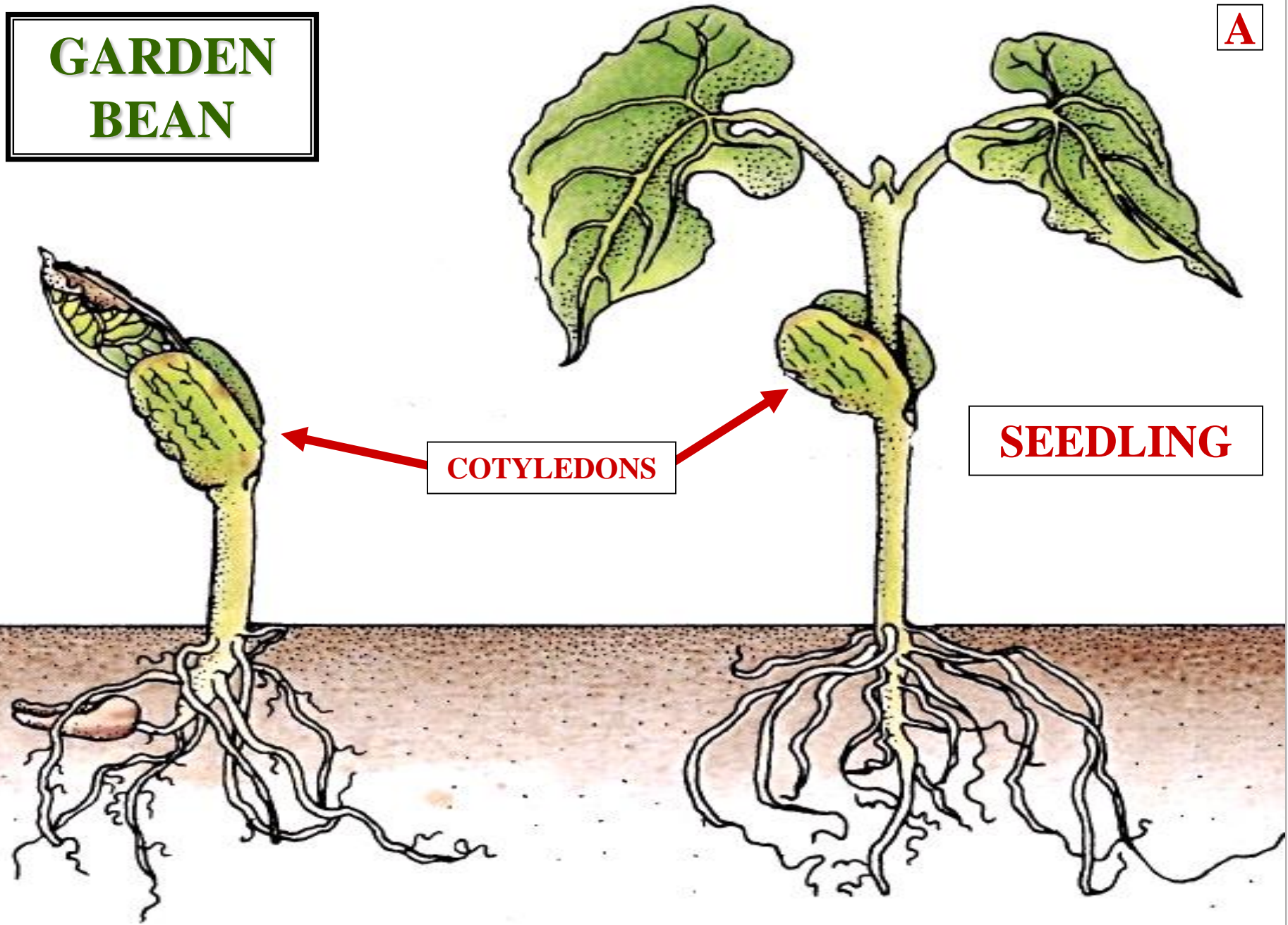
EPIGEAL GERMINATION

SEEDLING



GARDEN BEAN

A

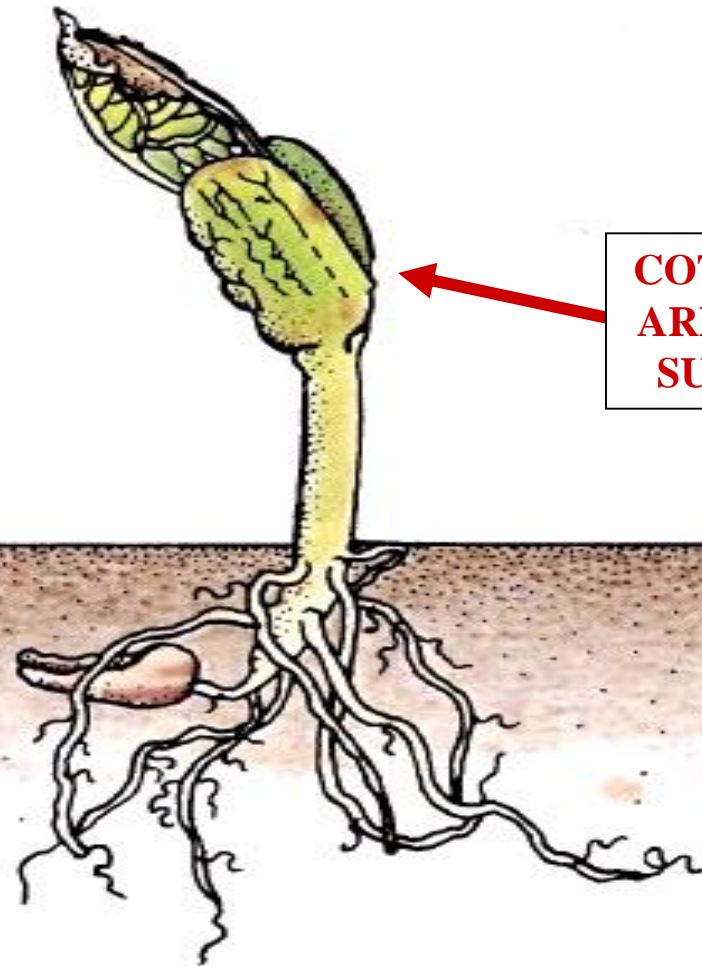


COTYLEDONS

SEEDLING

GARDEN BEAN

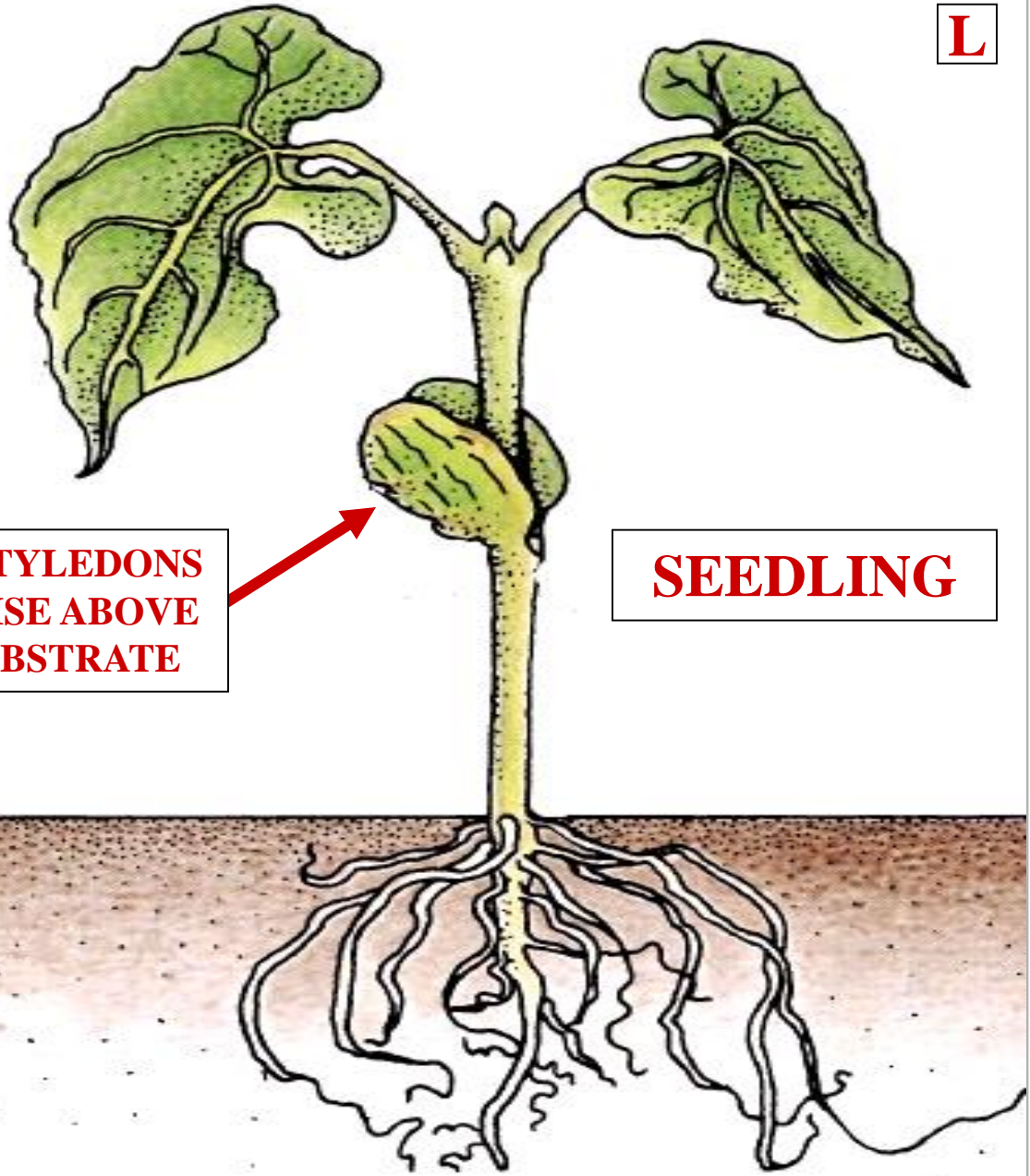
L



**COTYLEDONS
ARISE ABOVE
SUBSTRATE**



SEEDLING

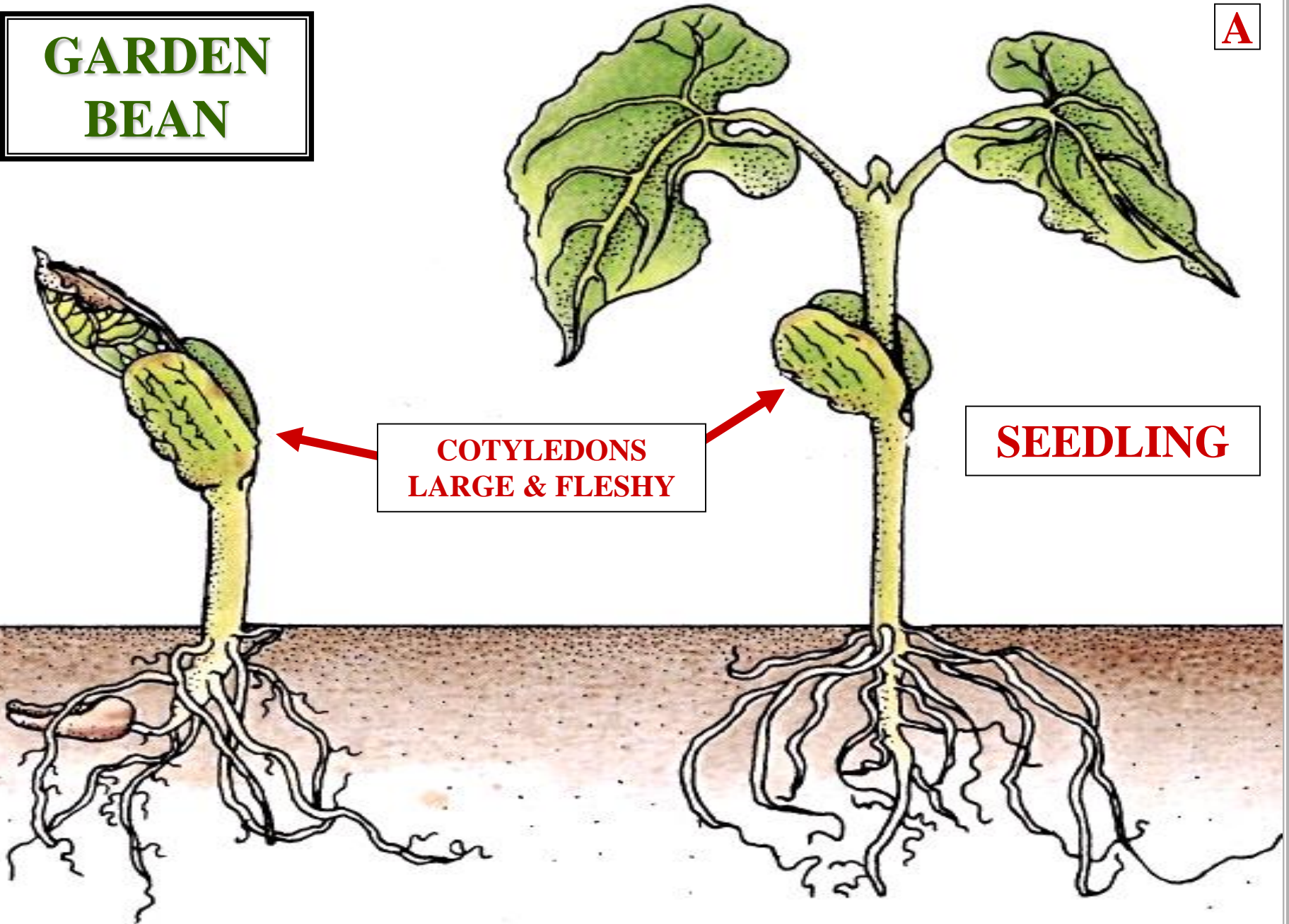


GARDEN BEAN

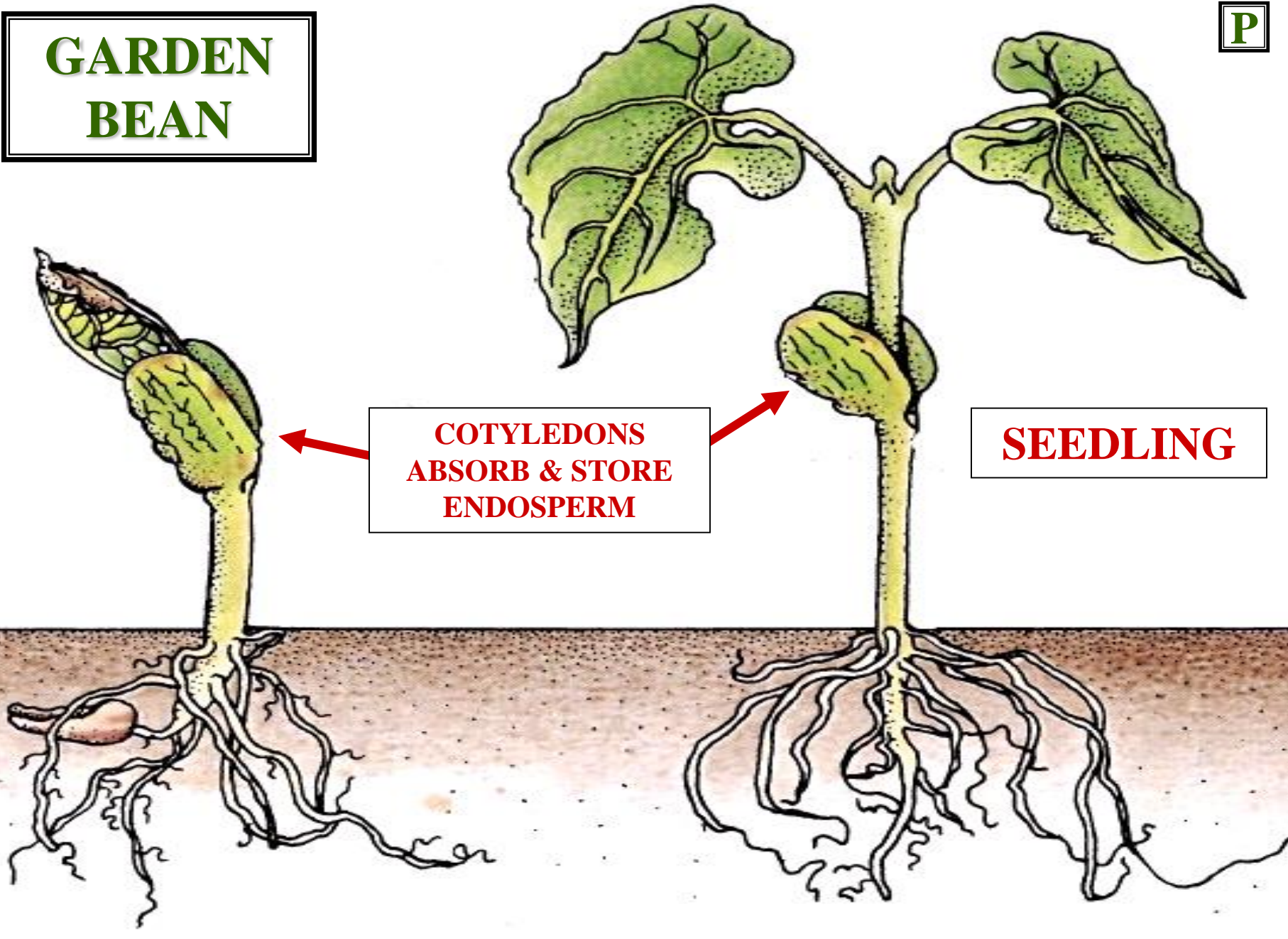
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**COTYLEDONS
LARGE & FLESHY**

SEEDLING



GARDEN BEAN

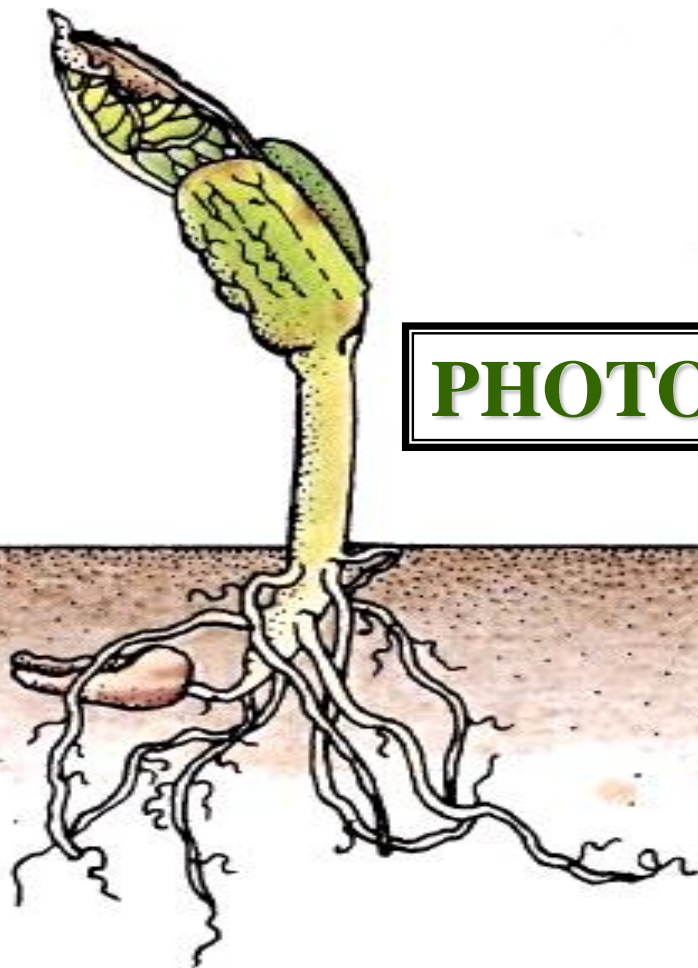


**COTYLEDONS
ABSORB & STORE
ENDOSPERM**

SEEDLING

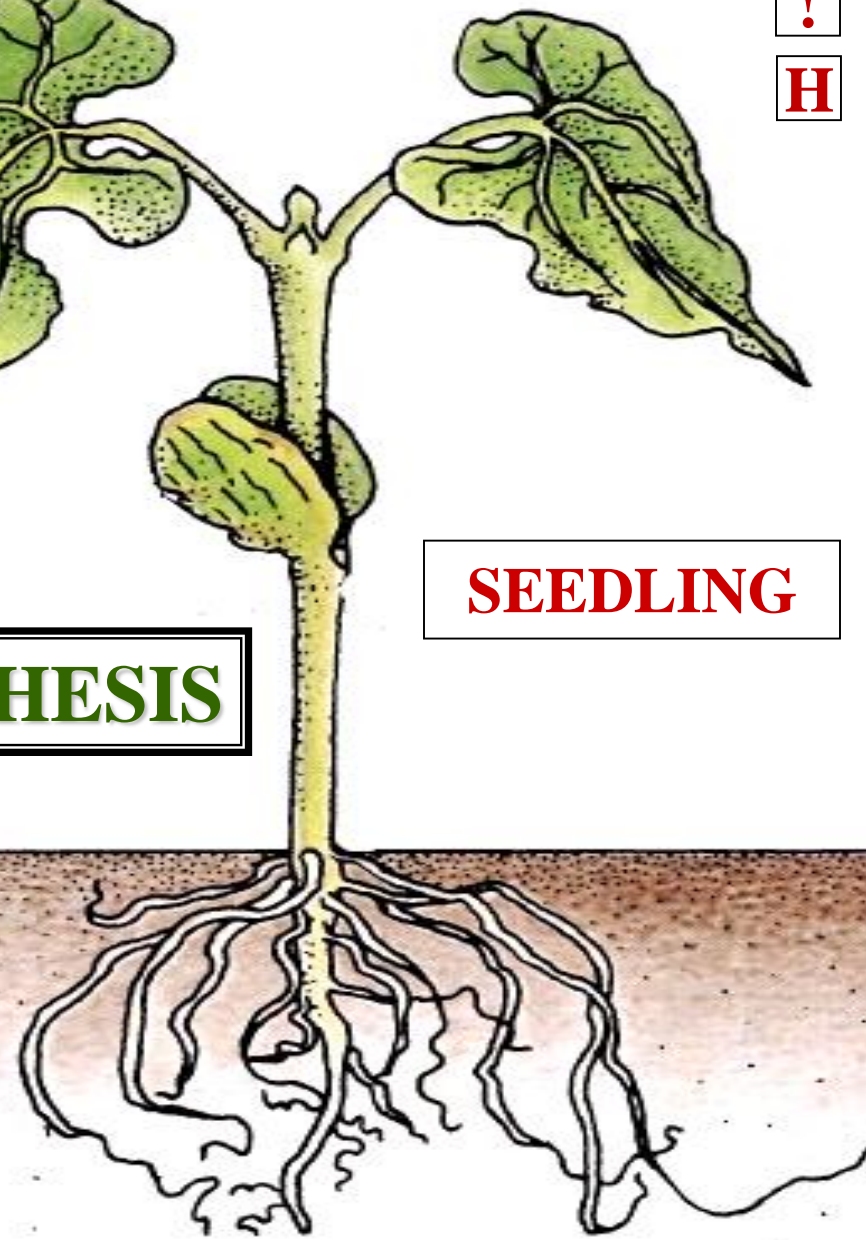
GARDEN BEAN

!
H



PHOTOSYNTHESIS

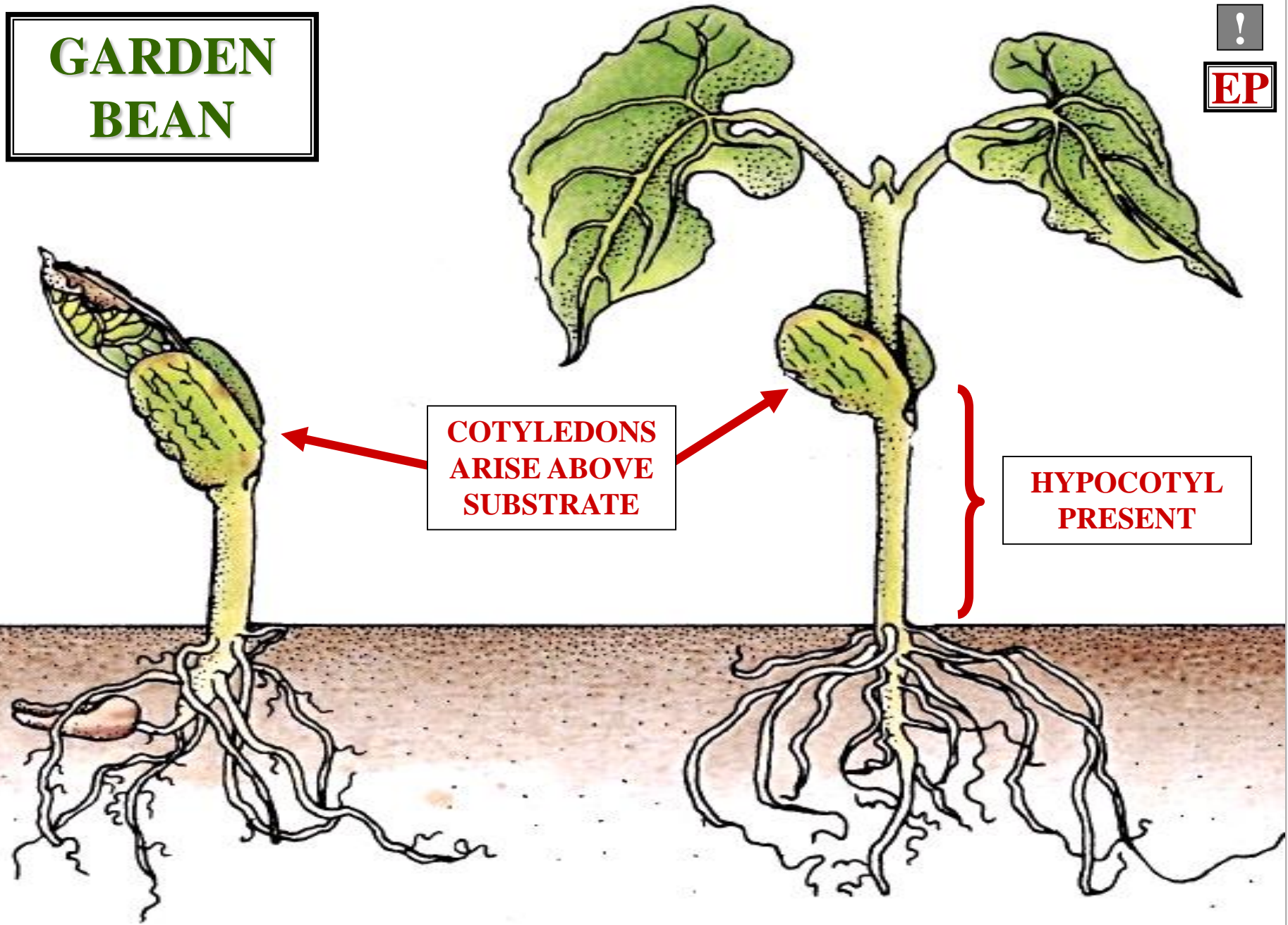
SEEDLING



GARDEN BEAN



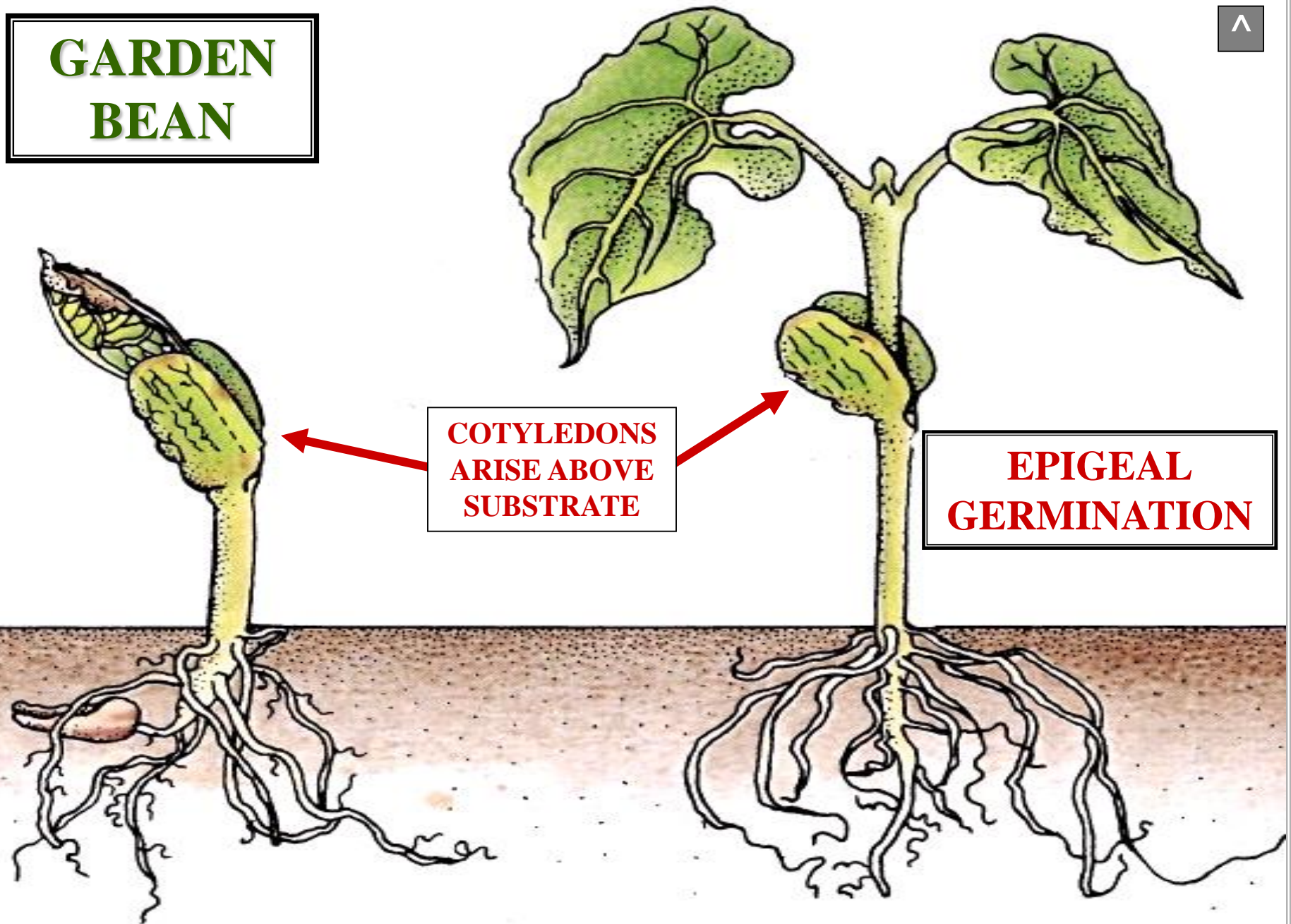
EP



**COTYLEDONS
ARISE ABOVE
SUBSTRATE**

**HYPOCOTYL
PRESENT**

GARDEN BEAN



**COTYLEDONS
ARISE ABOVE
SUBSTRATE**

**EPIGEAL
GERMINATION**



HYPOGEAL GERMINATION

HYPOGEAL GERMINATION

HYPOGEAL GERMINATION

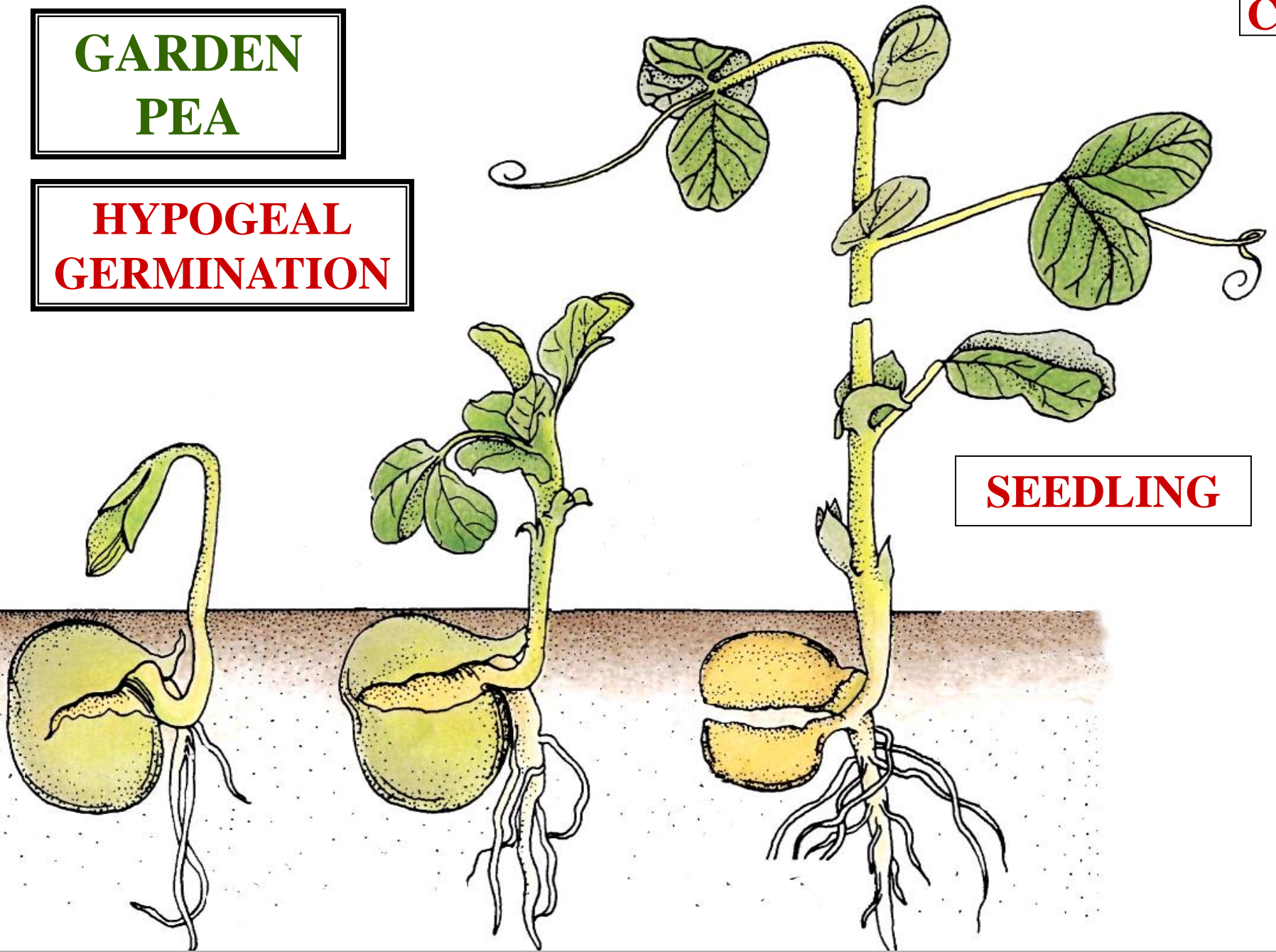


**COTYLEDONS
DO NOT
EMERGE FROM SEED**

HYPOGEAL GERMINATION

**GARDEN
PEA**

**HYPOGEAL
GERMINATION**



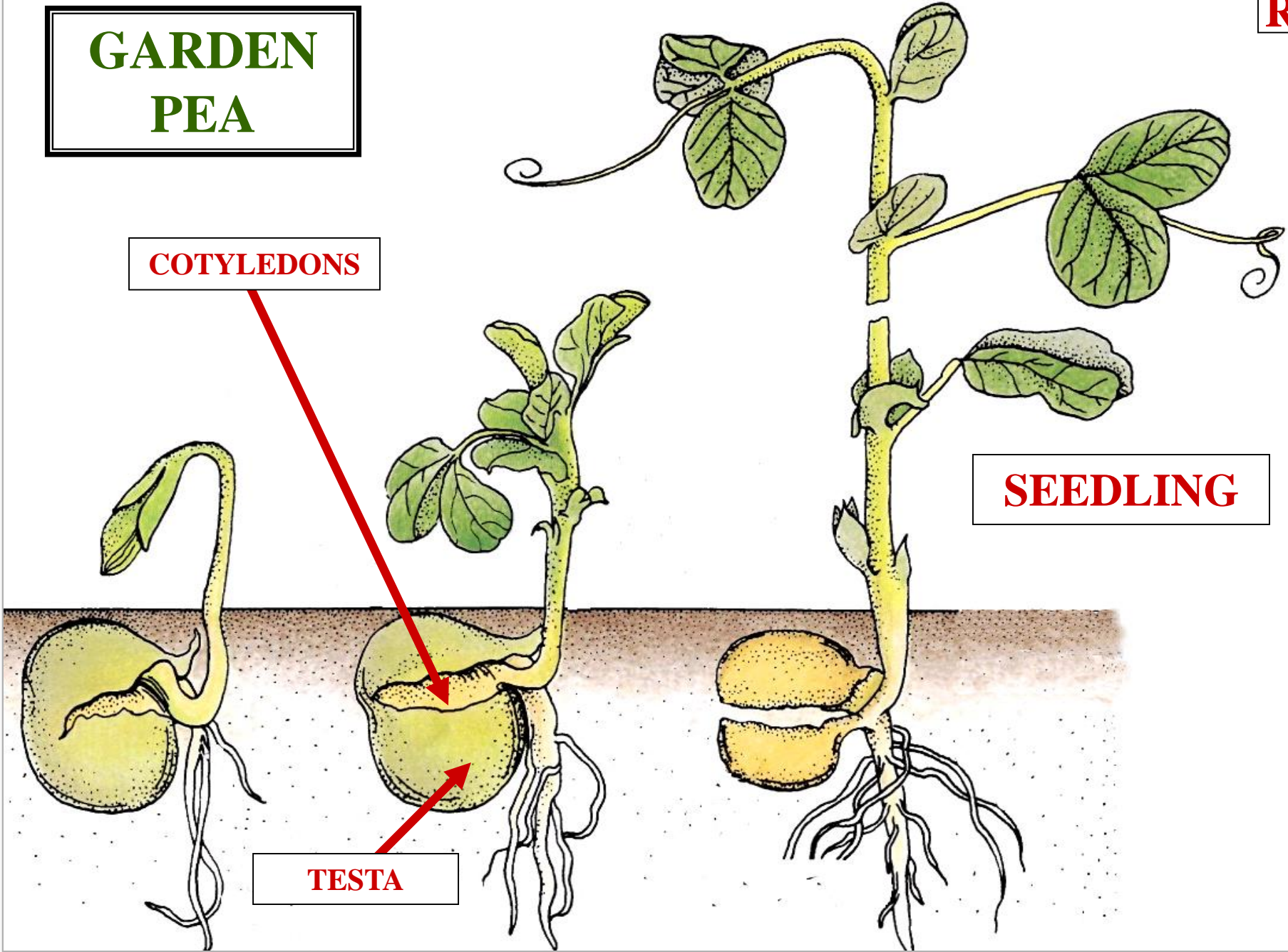
SEEDLING

GARDEN PEA

COTYLEDONS

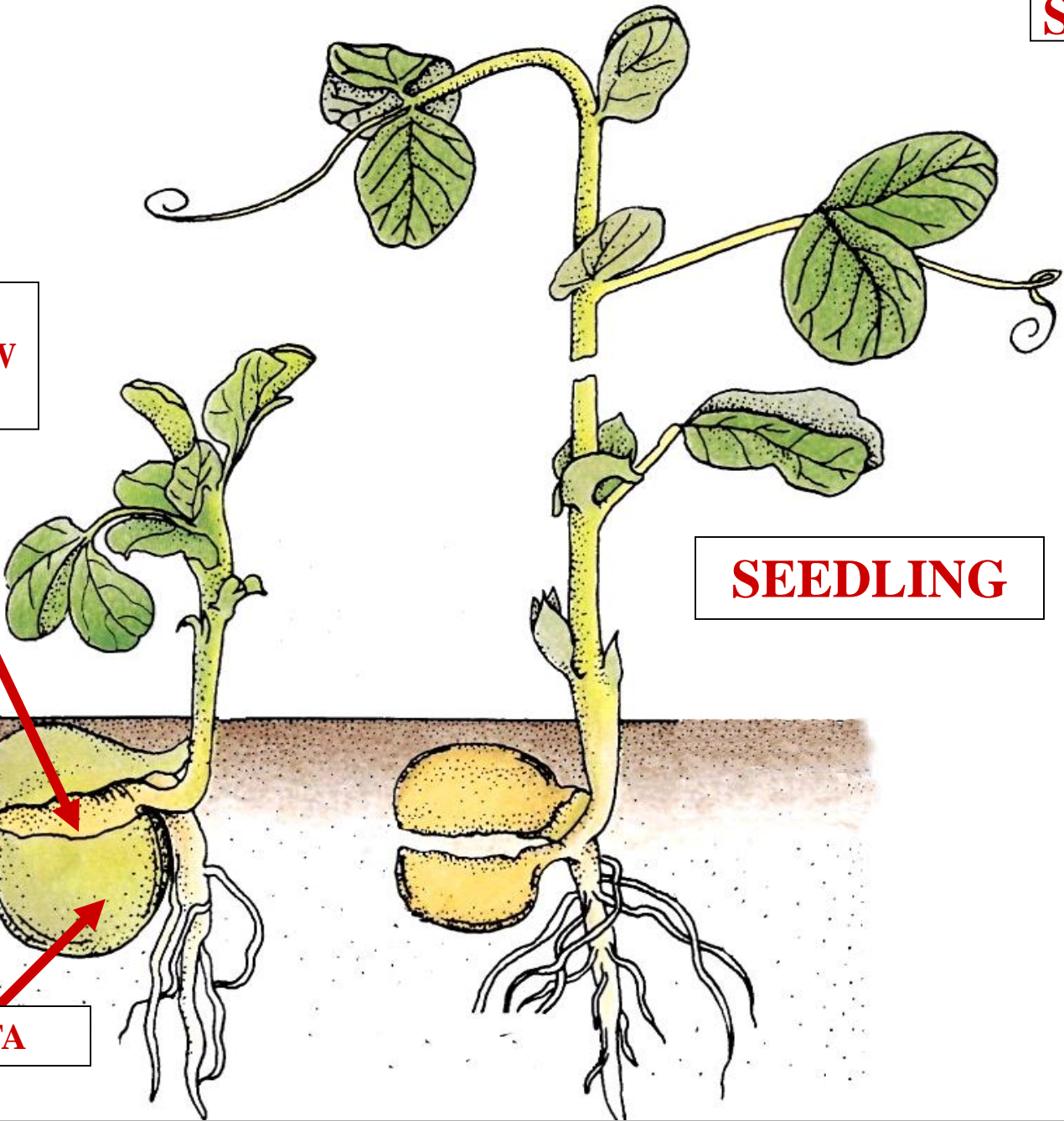
TESTA

SEEDLING



GARDEN PEA

**COTYLEDONS
REMAIN BELOW
SUBSTRATE**



SEEDLING

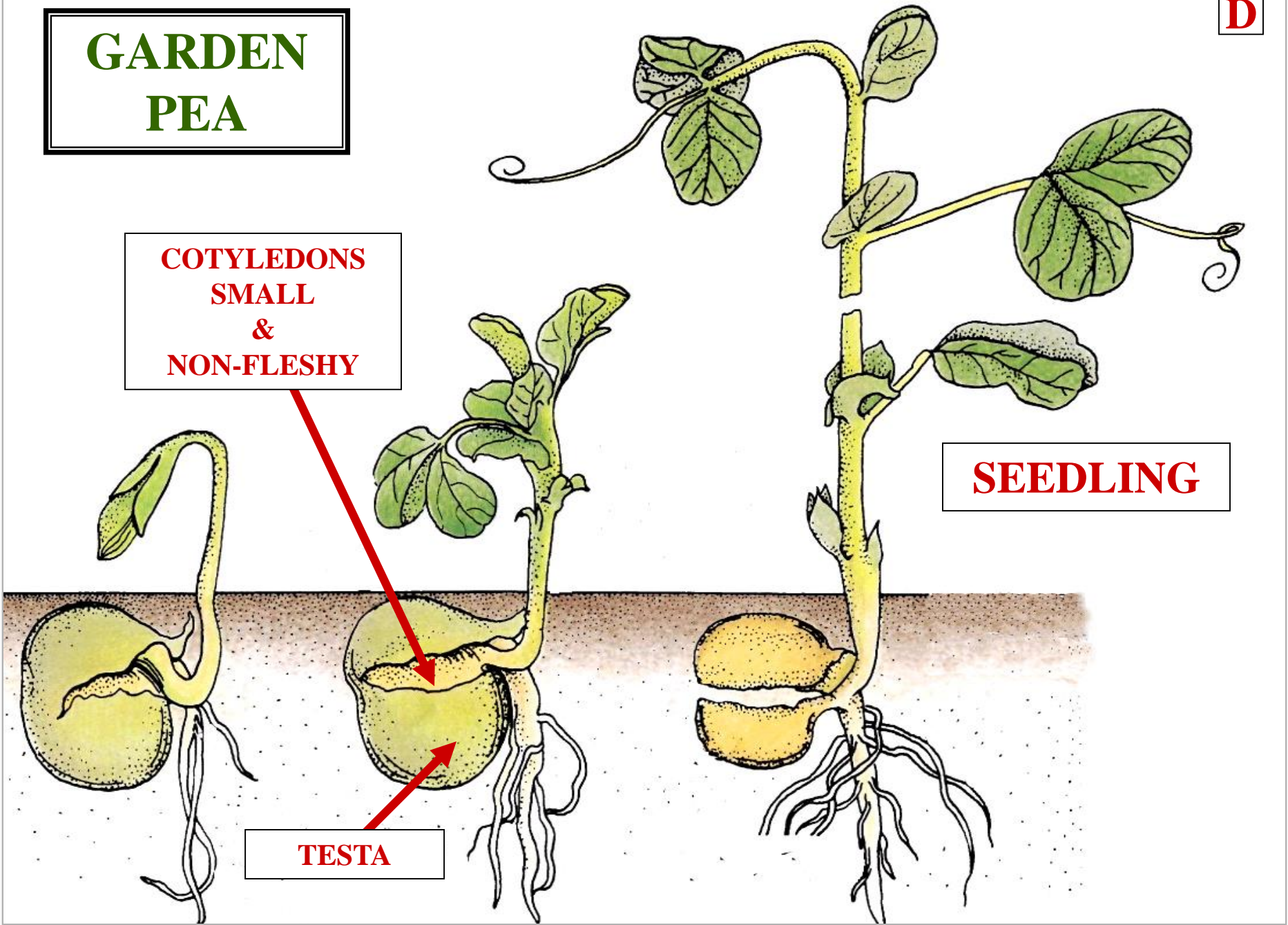
TESTA

GARDEN PEA

**COTYLEDONS
SMALL
&
NON-FLESHY**

SEEDLING

TESTA

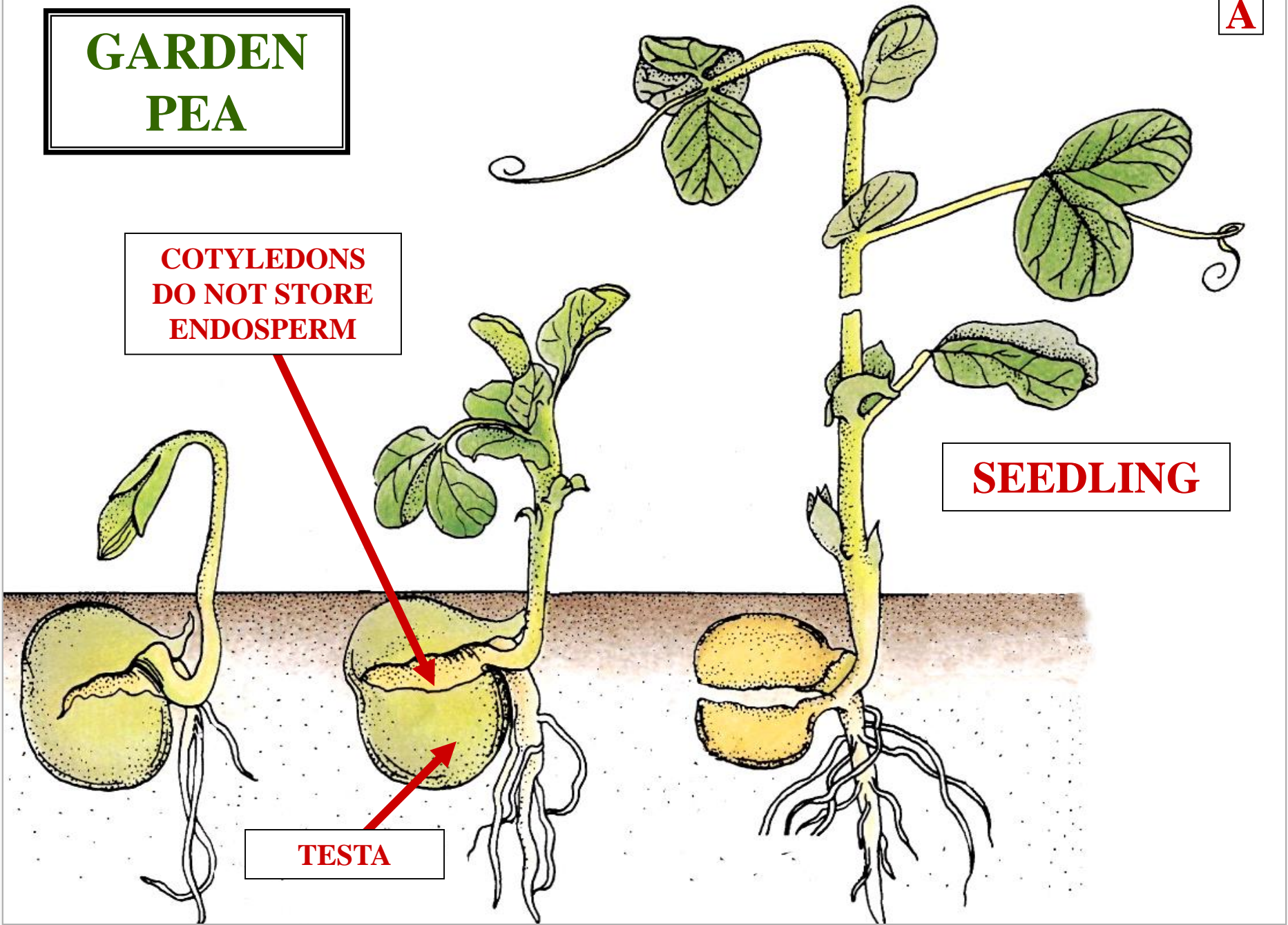


GARDEN PEA

**COTYLEDONS
DO NOT STORE
ENDOSPERM**

TESTA

SEEDLING

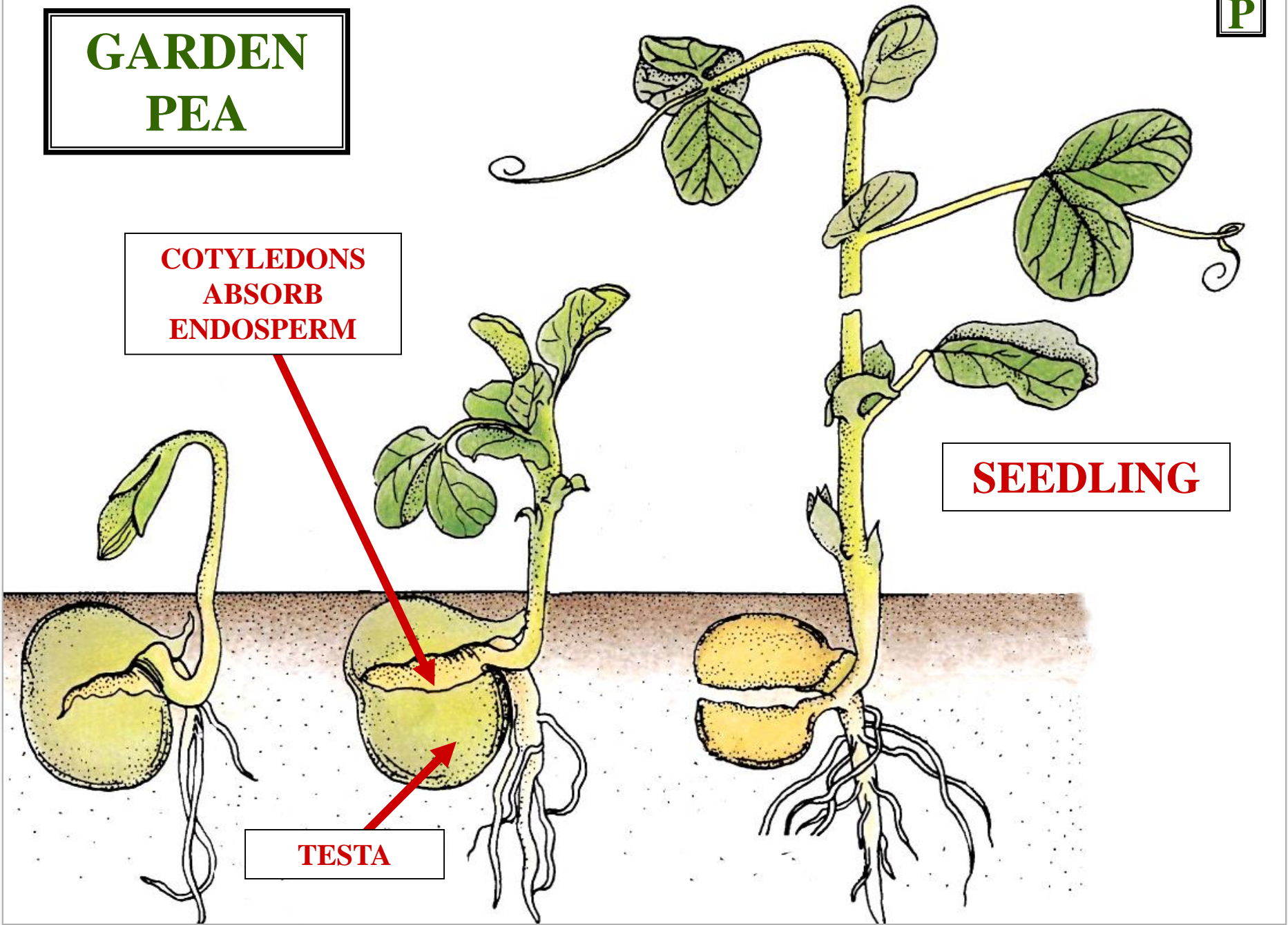


GARDEN PEA

**COTYLEDONS
ABSORB
ENDOSPERM**

TESTA

SEEDLING



PHOTOSYNTHESIS

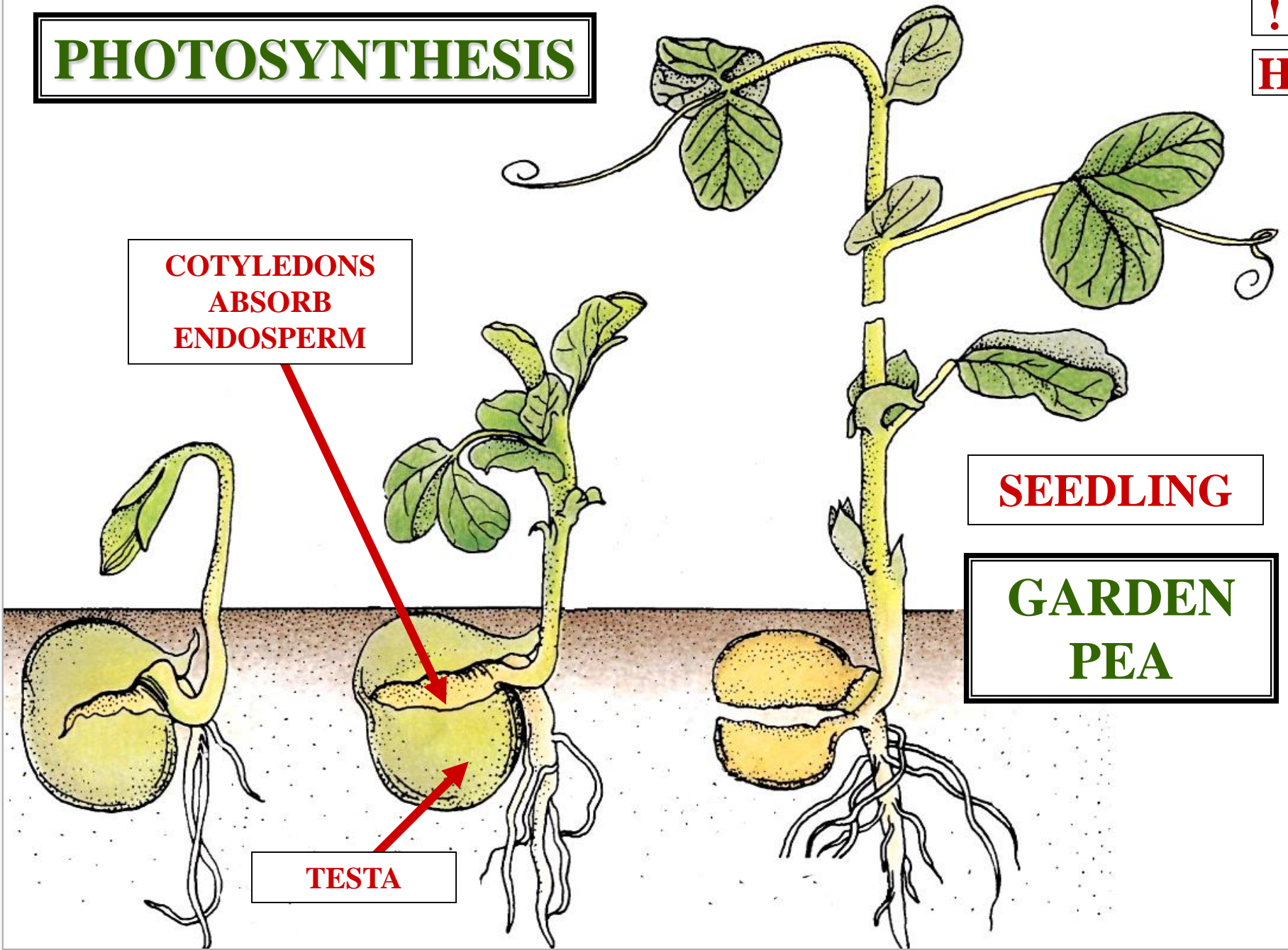
!
H

COTYLEDONS
ABSORB
ENDOSPERM

TESTA

SEEDLING

GARDEN
PEA



GARDEN PEA

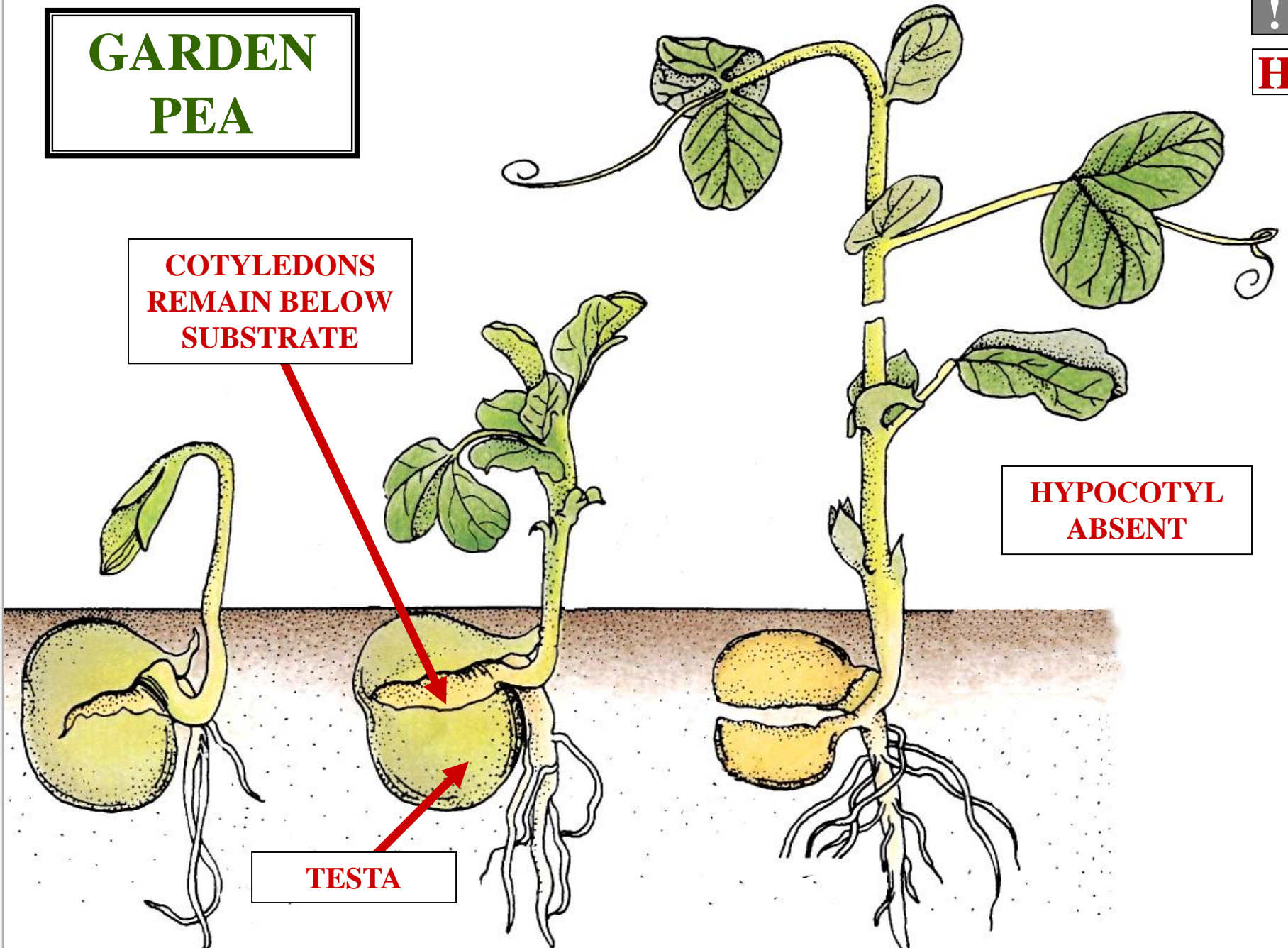


H

**COTYLEDONS
REMAIN BELOW
SUBSTRATE**

**HYPOCOTYL
ABSENT**

TESTA

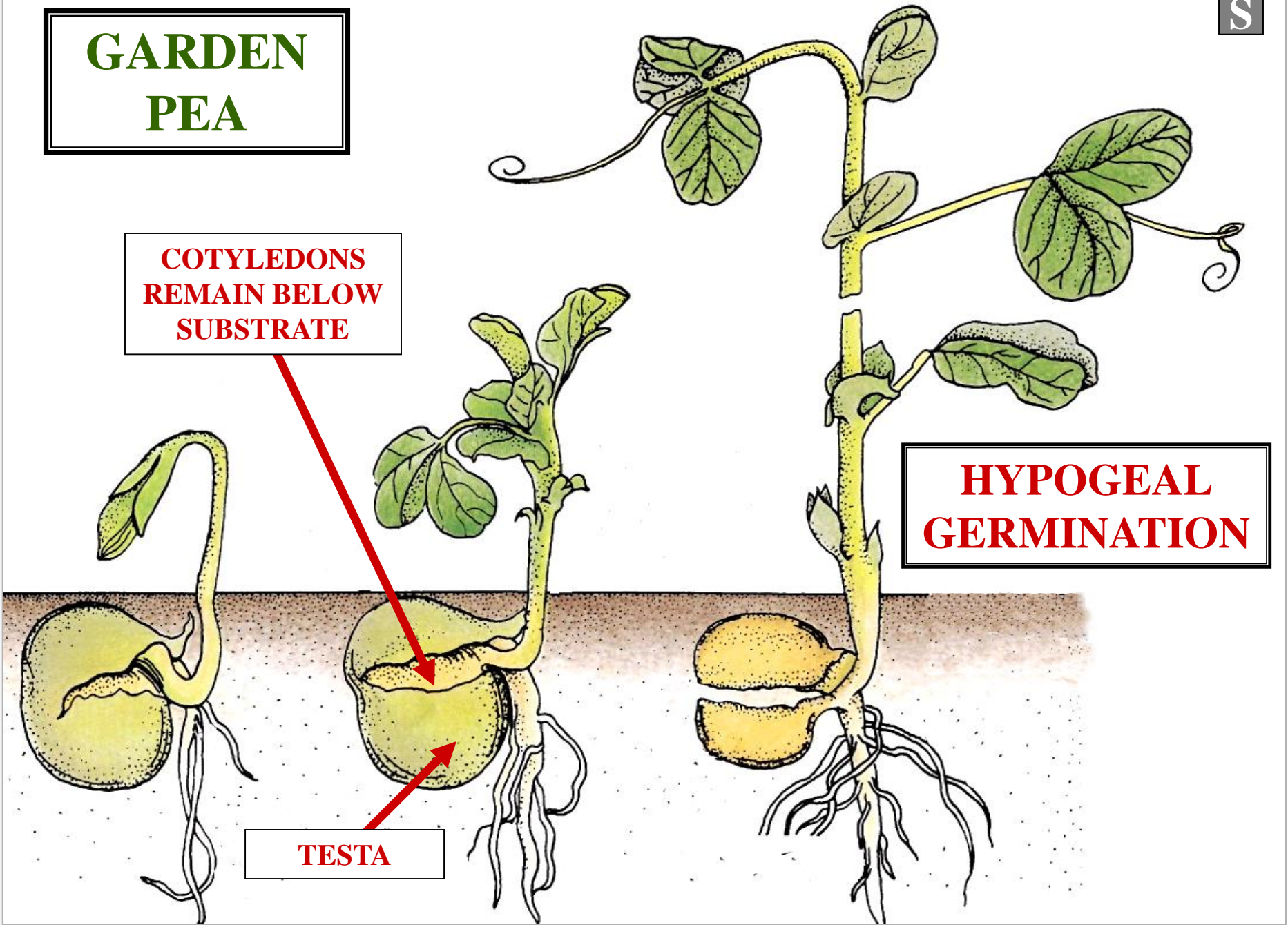


GARDEN PEA

COTYLEDONS REMAIN BELOW SUBSTRATE

TESTA

HYPOGEAL GERMINATION

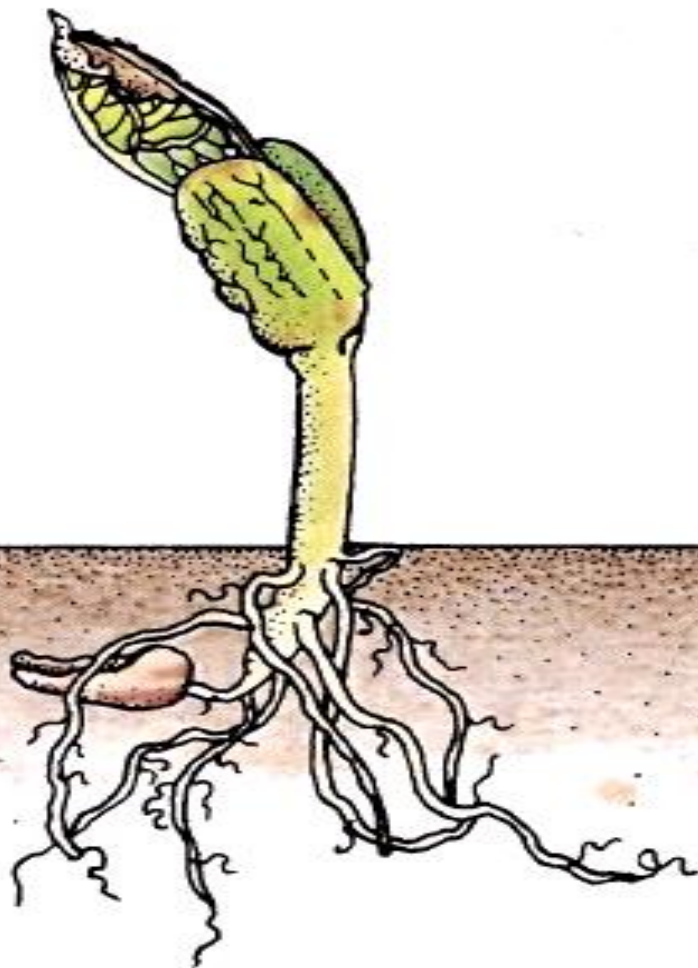




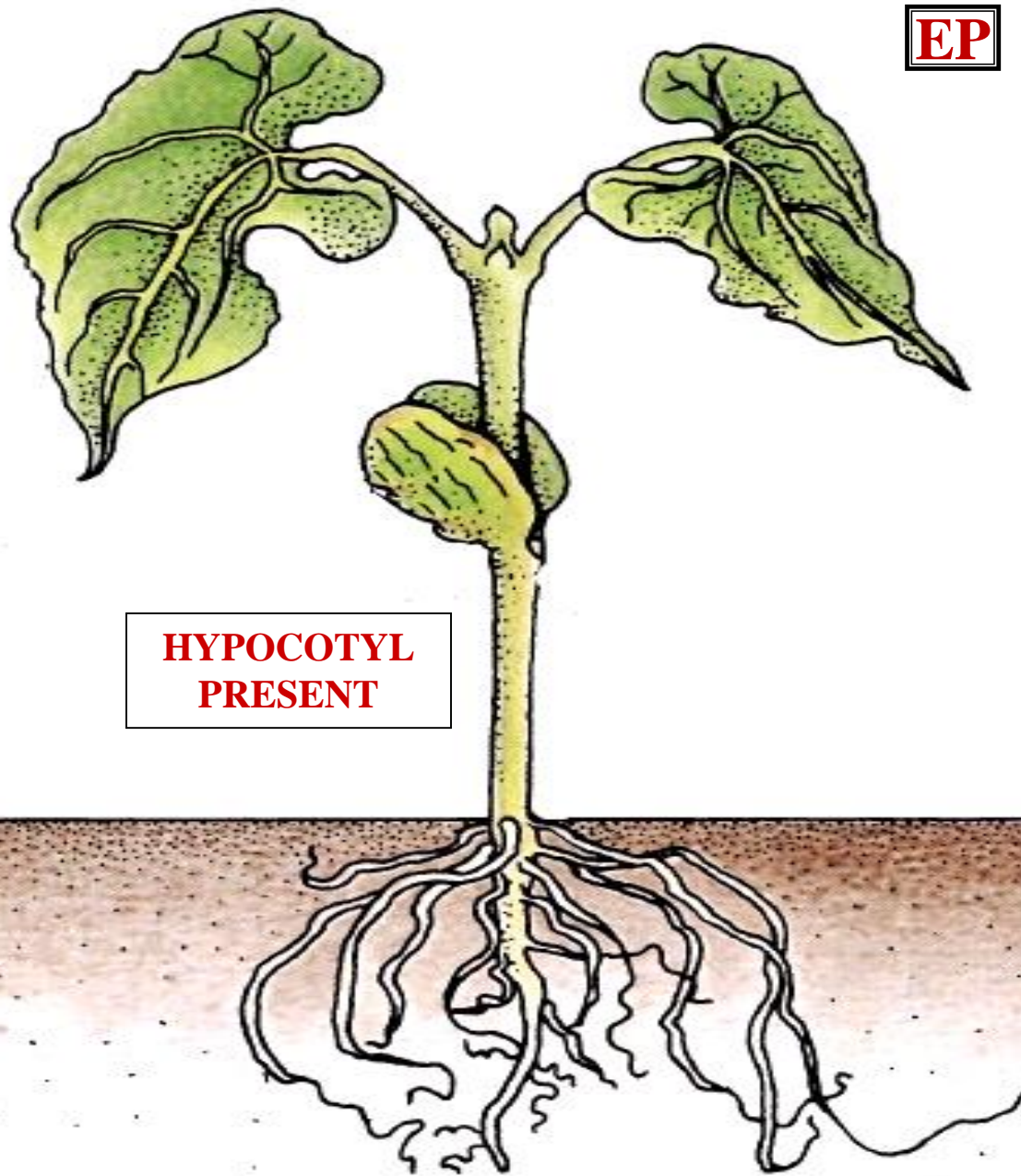
GERMINATION TYPES SUMMARY

GARDEN BEAN

EP

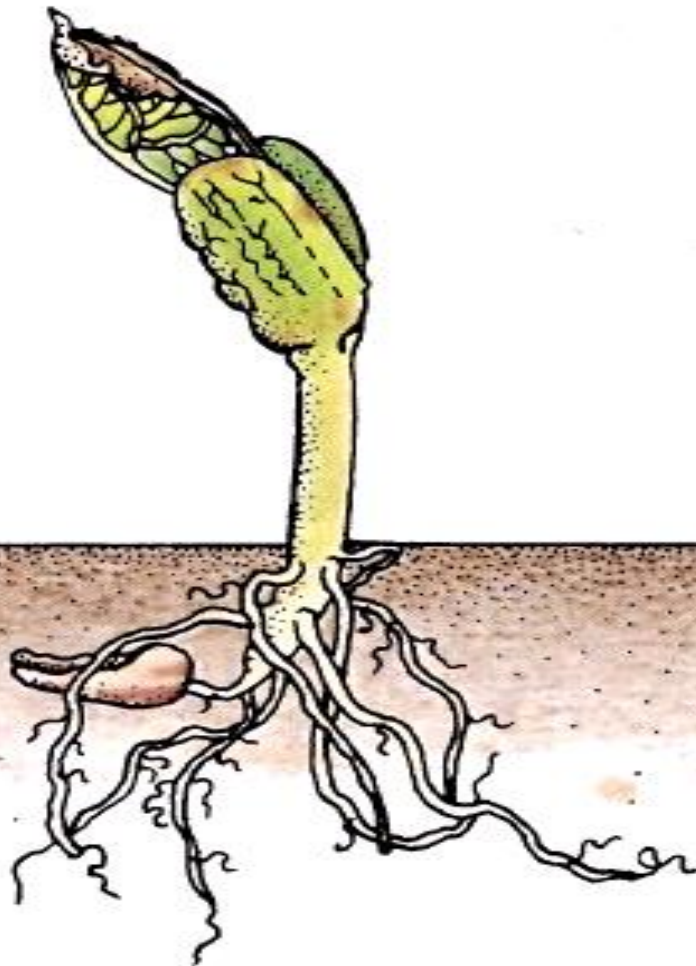


**HYPOCOTYL
PRESENT**



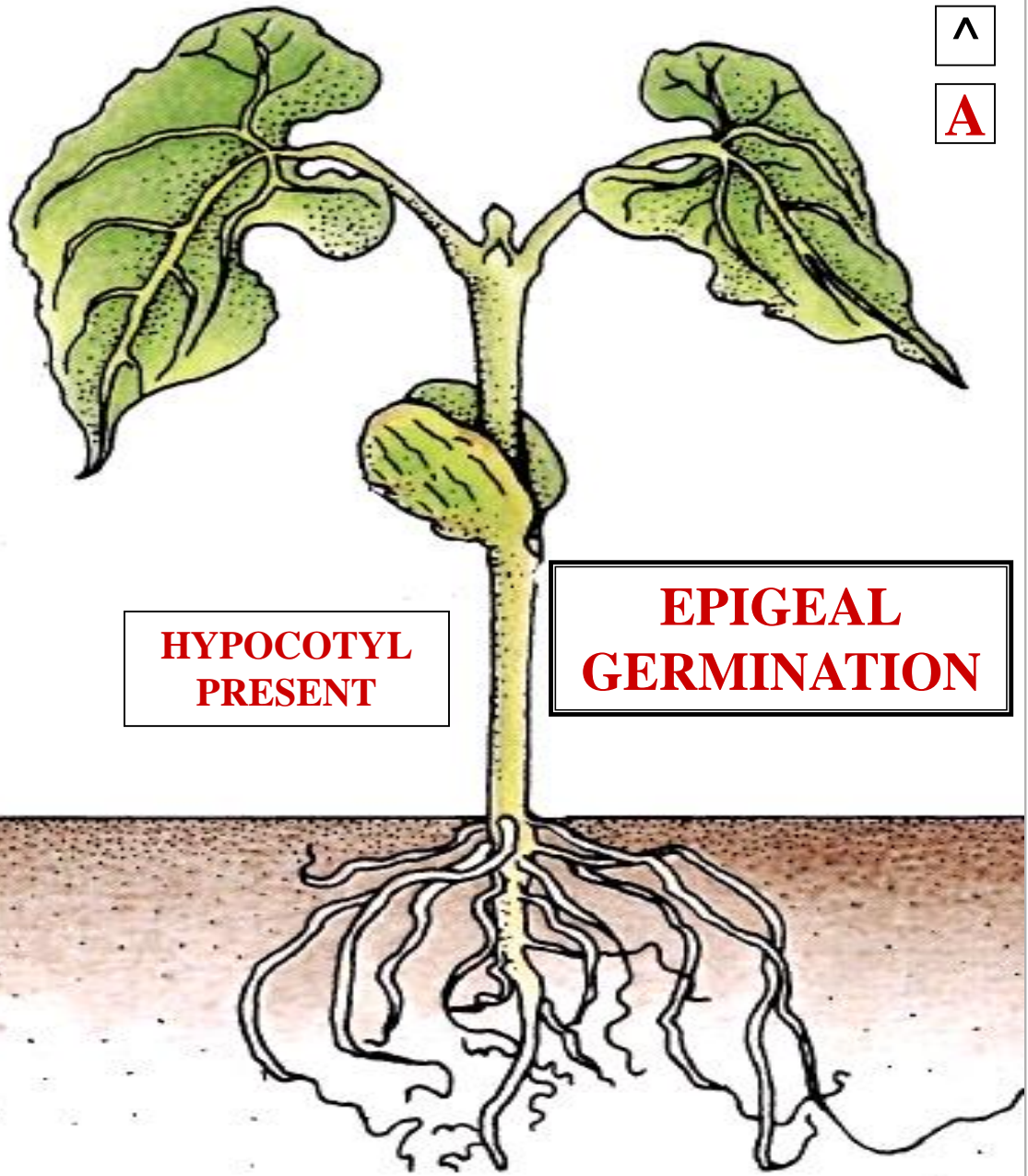
GARDEN BEAN

^
A

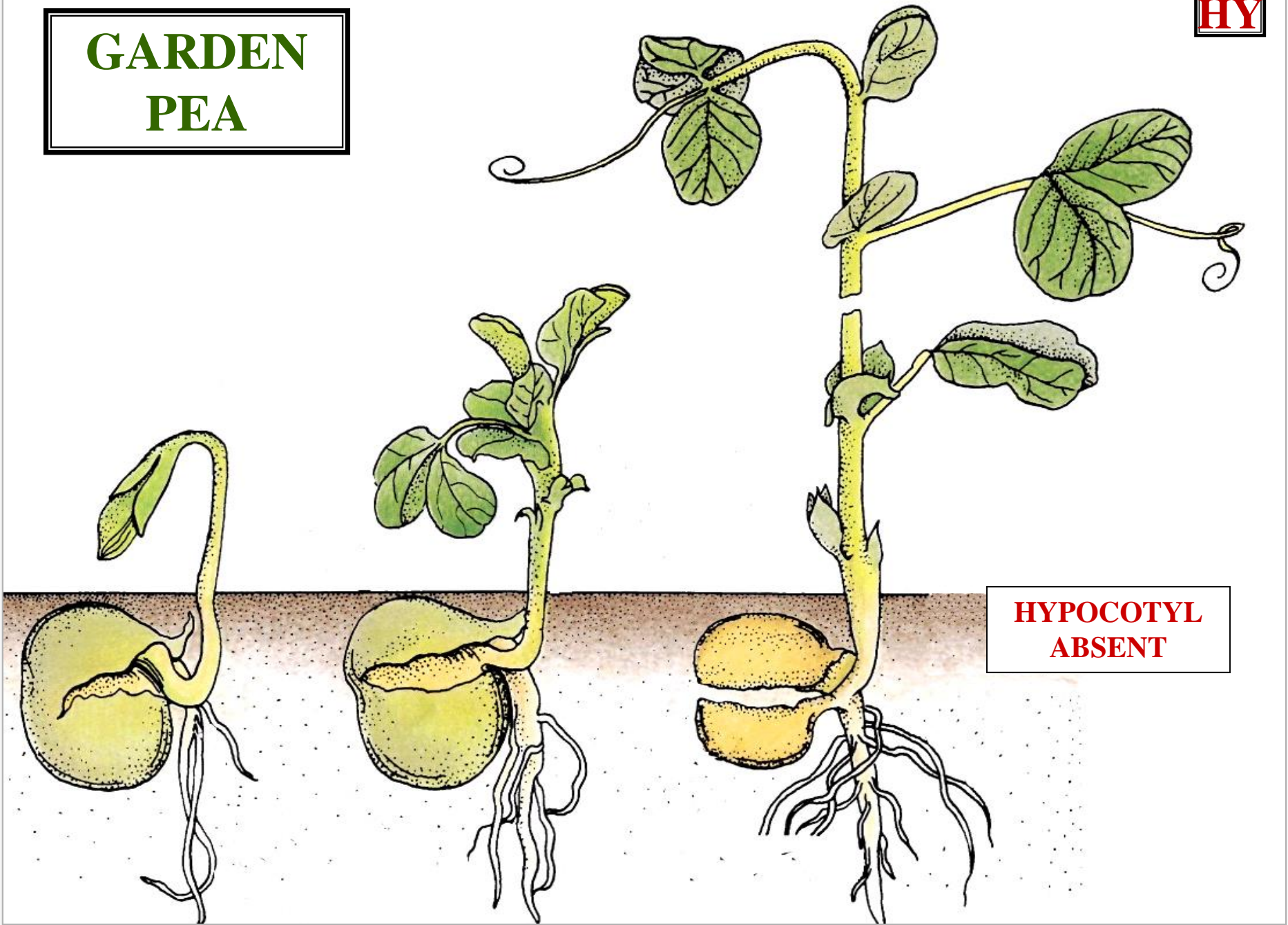


**HYPOCOTYL
PRESENT**

**EPIGEAL
GERMINATION**



**GARDEN
PEA**

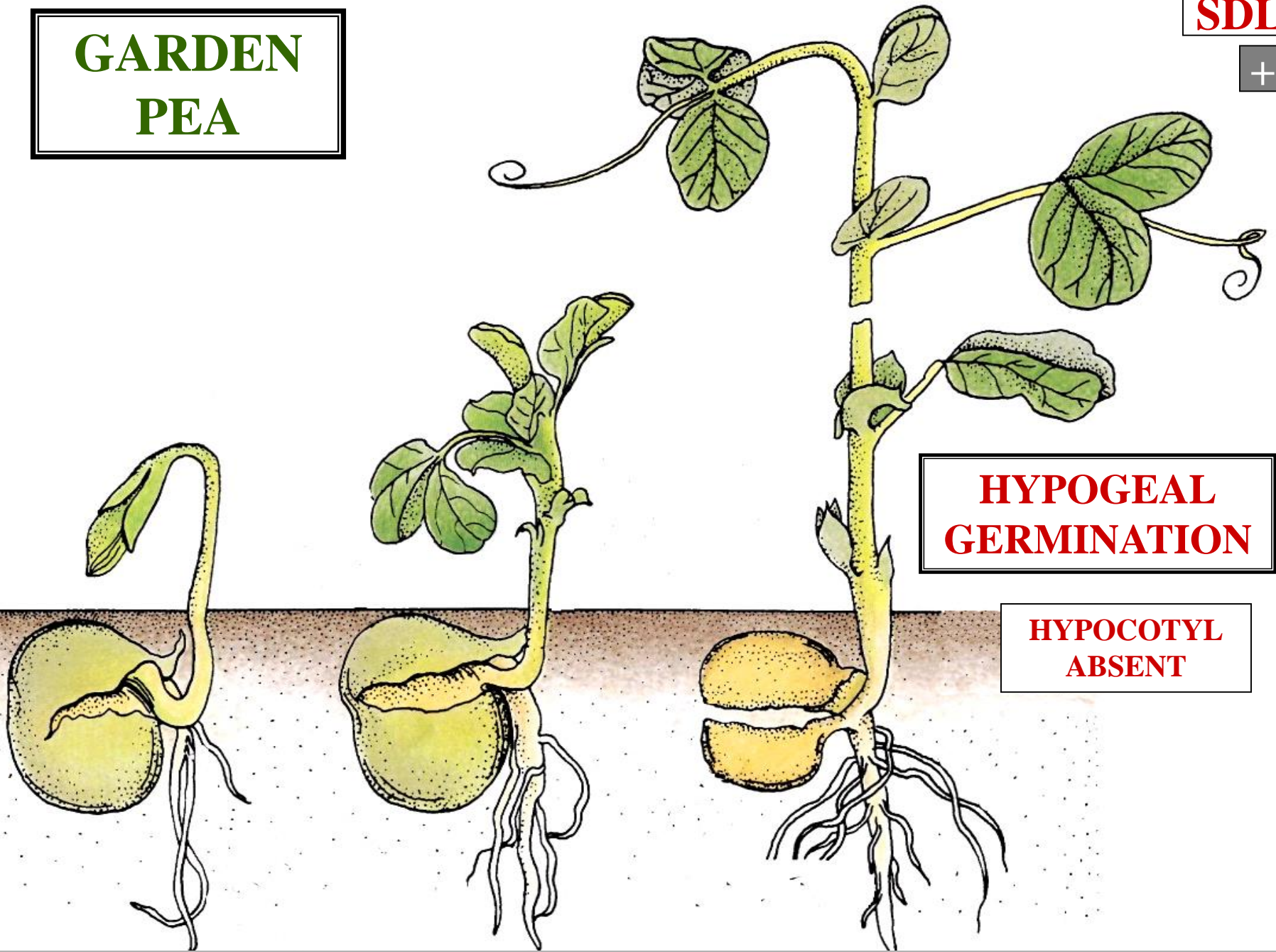


**HYPOCOTYL
ABSENT**

GARDEN PEA

SDL

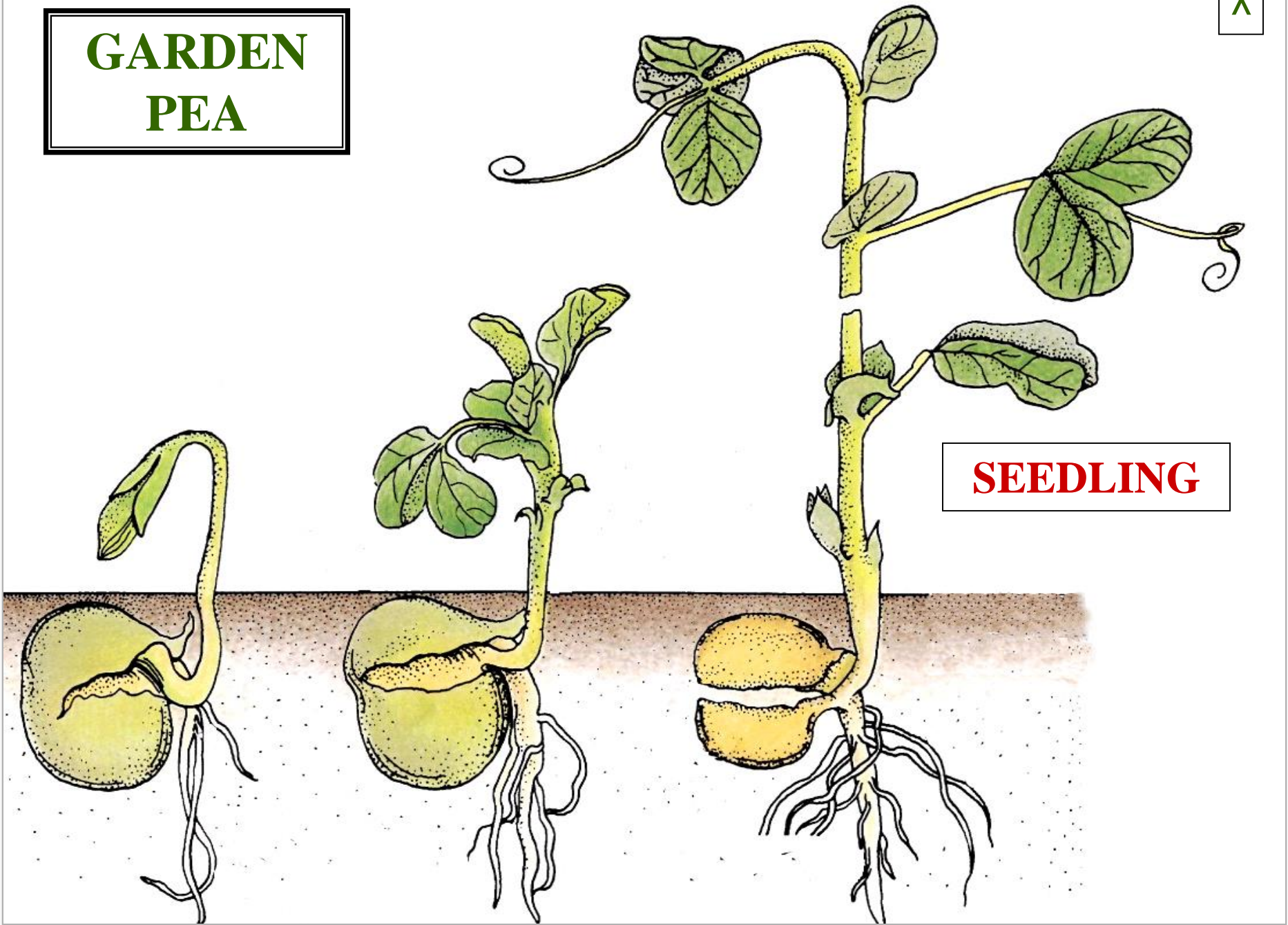
+



**HYPOGEAL
GERMINATION**

**HYPOCOTYL
ABSENT**

GARDEN PEA



SEEDLING



ANGIOSPERM PLANT BODY



ANIMAL GROWTH VS PLANT GROWTH



ANIMAL GROWTH



A photograph of a herd of bison in a grassy field. Two bison are in the foreground, facing each other. The background shows several more bison. The lighting is warm, suggesting late afternoon or early morning.

ANIMAL GROWTH: DETERMINATE



ANIMAL GROWTH: DIFFUSE



PLANT GROWTH





PLANT GROWTH: INDETERMINATE



PLANT GROWTH: NON-DIFFUSE



PLANT GROWTH SPECIFICS

GROWTH HABIT

**ANGIOSPERM
GROWTH HABIT**

ANNUAL

**ANGIOSPERM
GROWTH HABIT**

**ANGIOSPERM
GROWTH HABIT**

**ANNUAL
BIENNIAL**

**ANGIOSPERM
GROWTH HABIT**



ANGIOSPERM GROWTH HABIT

ANNUAL

BIENNIAL

PERENNIAL

ANGIOSPERM GROWTH HABIT

ANNUAL PLANT

ANNUAL PLANT

**ANNUAL
GROWTH HABIT**

EG



**COMPLETES
LIFE CYCLE
1 SEASON**

**ANNUAL
GROWTH HABIT**

S



CORN



S

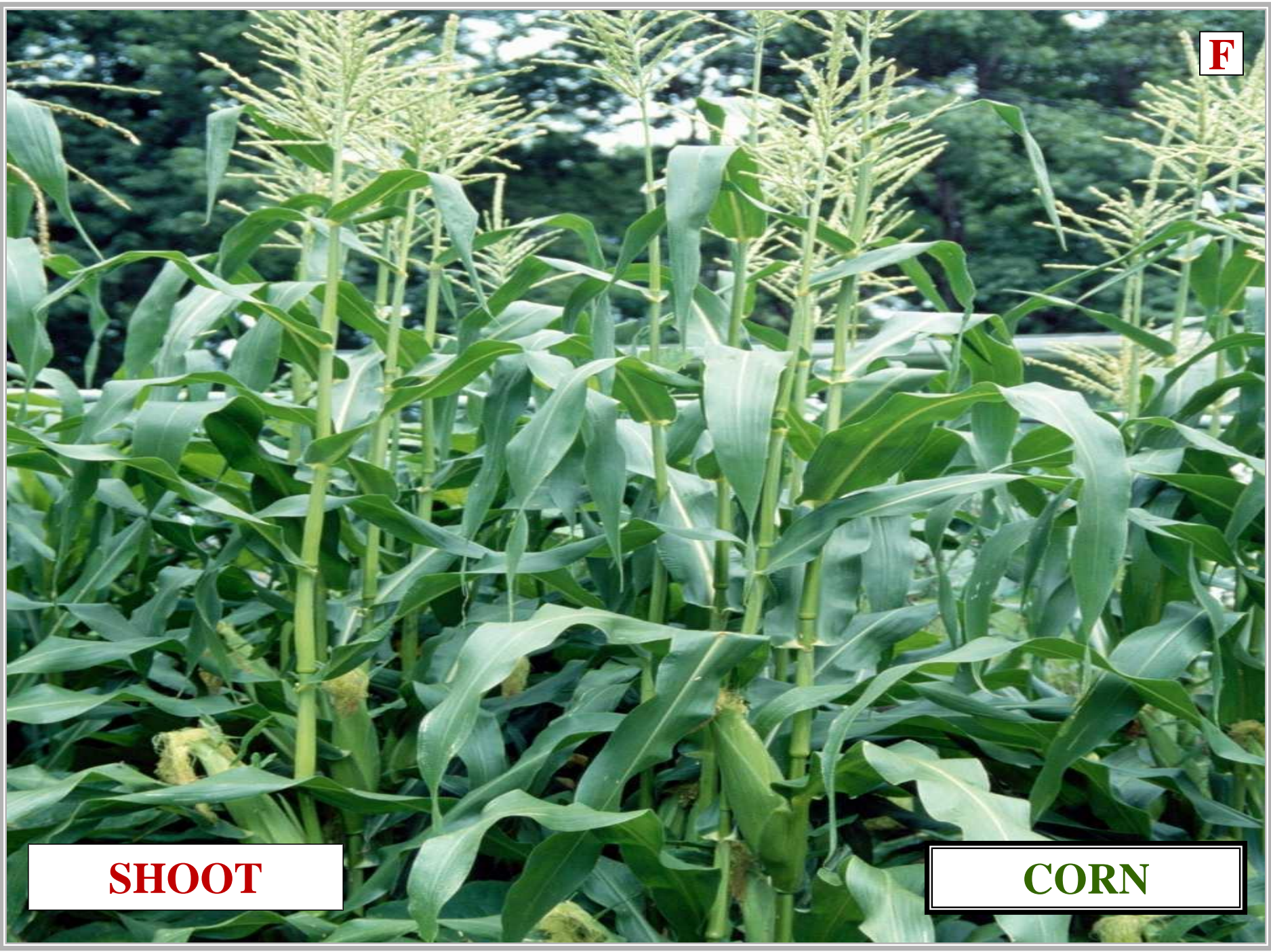
SEED

CORN

F

SHOOT

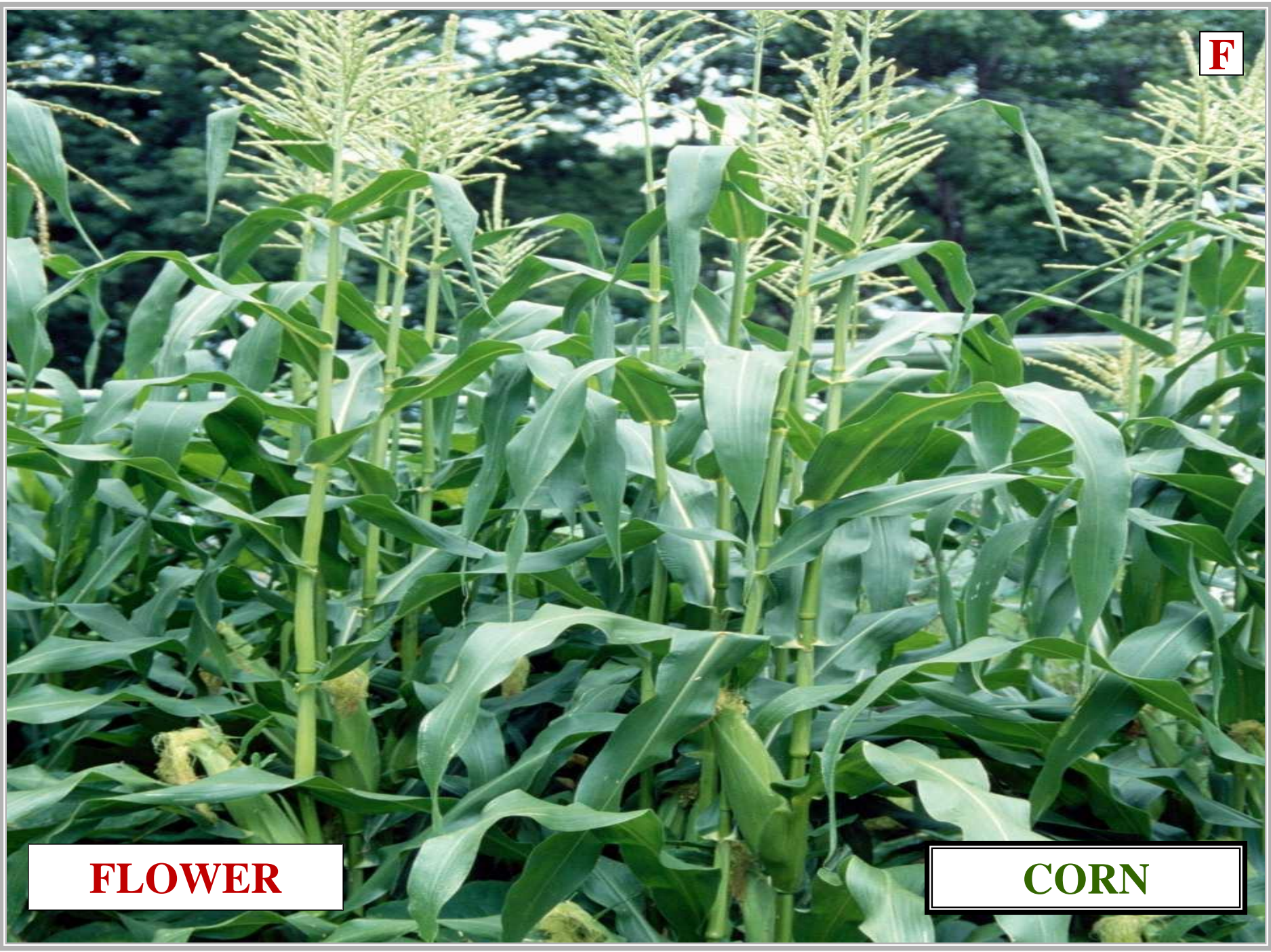
CORN



F

FLOWER

CORN

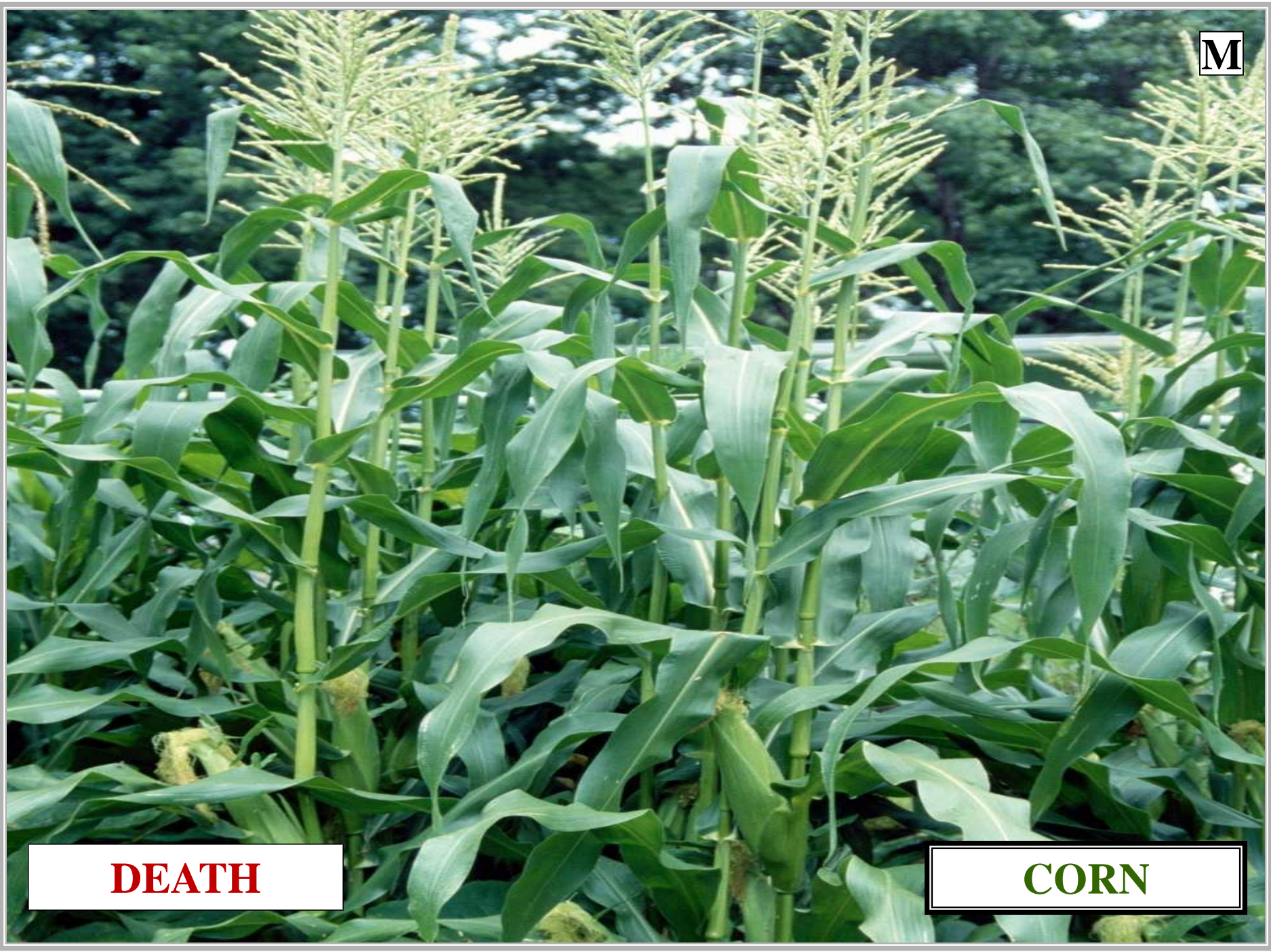


D

FRUIT / SEED

CORN





DEATH

CORN

MONOCARPIC

MONOCARPIC



**PLANT
FLOWERS ONCE
DURING LIFE CYCLE**

MONOCARPIC

ANNUAL PLANT

MONOCARPIC

CORN



HERBACEOUS TISSUE

CORN

BIENNIAL PLANT

BIENNIAL PLANT

**BIENNIAL
GROWTH HABIT**

EG



**COMPLETES
LIFE CYCLE
2 SEASONS**

**BIENNIAL
GROWTH HABIT**





S

1ST SEASON

B



SEED



BASAL LEAF ROSETTE

PHOTOSYNTHESIS

S



WATER

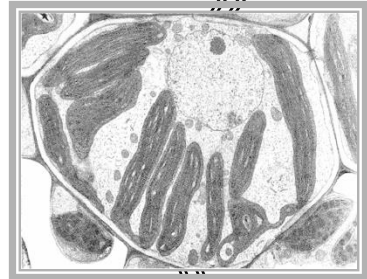
CO₂

LIGHT ENERGY

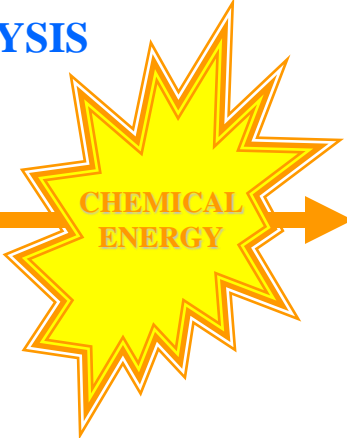
PHOTO

ATMOSPHERE

E- PHOTOLYSIS



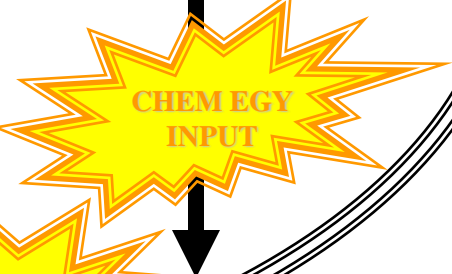
LT RXT
THYLAKOID



DK RXT
STROMA

CHLOROPLAST

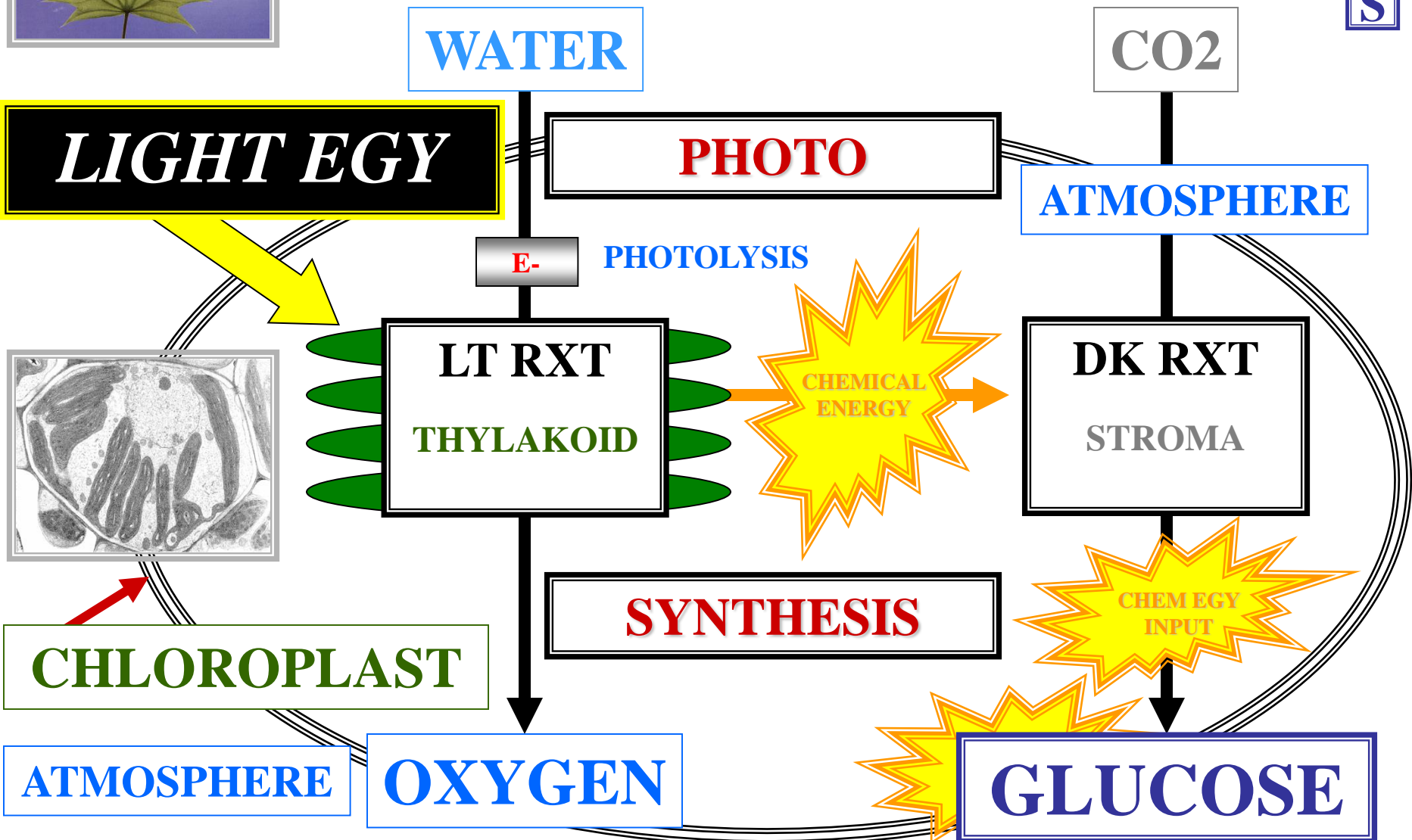
SYNTHESIS



ATMOSPHERE

OXYGEN

GLUCOSE



PHOTOSYNTHESIS



WATER

CO₂

SR

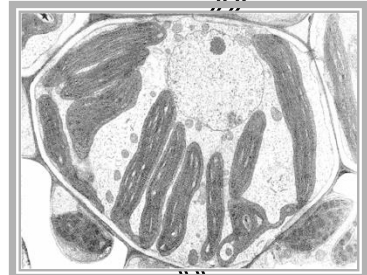
LIGHT ENERGY

PHOTO

ATMOSPHERE

E-

PHOTOLYSIS



LT RXT
THYLAKOID

CHEMICAL ENERGY

DK RXT
STROMA

CHLOROPLAST

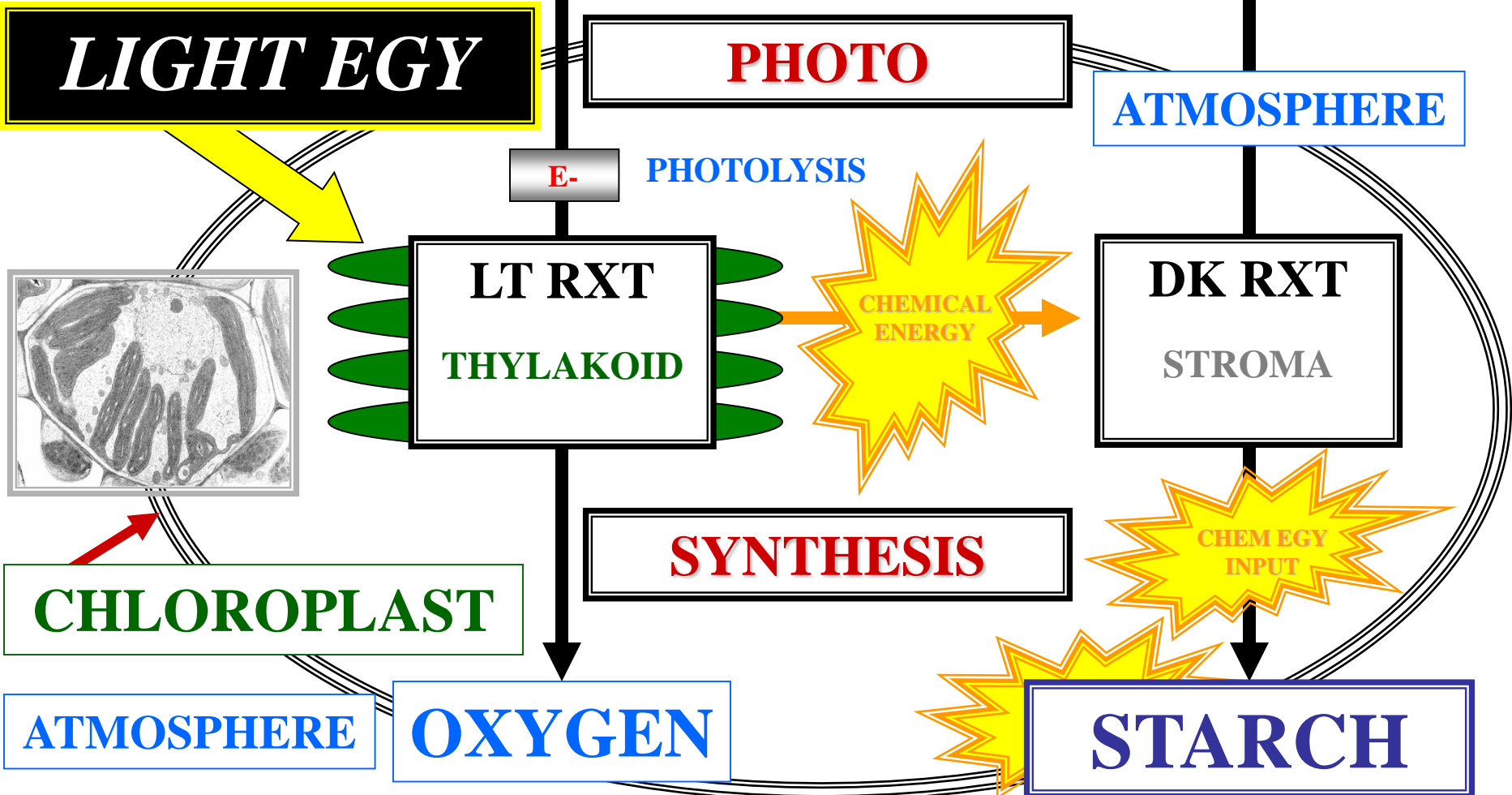
SYNTHESIS

CHEMICAL ENERGY INPUT

ATMOSPHERE

OXYGEN

STARCH





**GLUCOSE / STARCH
STORAGE ROOT**



QUEEN-ANN'S LACE





2ND SEASON



**GLUCOSE / STARCH
STORAGE ROOT**



S

QUEEN-ANN'S LACE





SHOOT



QUEEN-ANN'S LACE





FLOWER



QUEEN-ANN'S LACE





FRUIT / SEED



QUEEN-ANN'S LACE





DEATH



QUEEN-ANN'S LACE

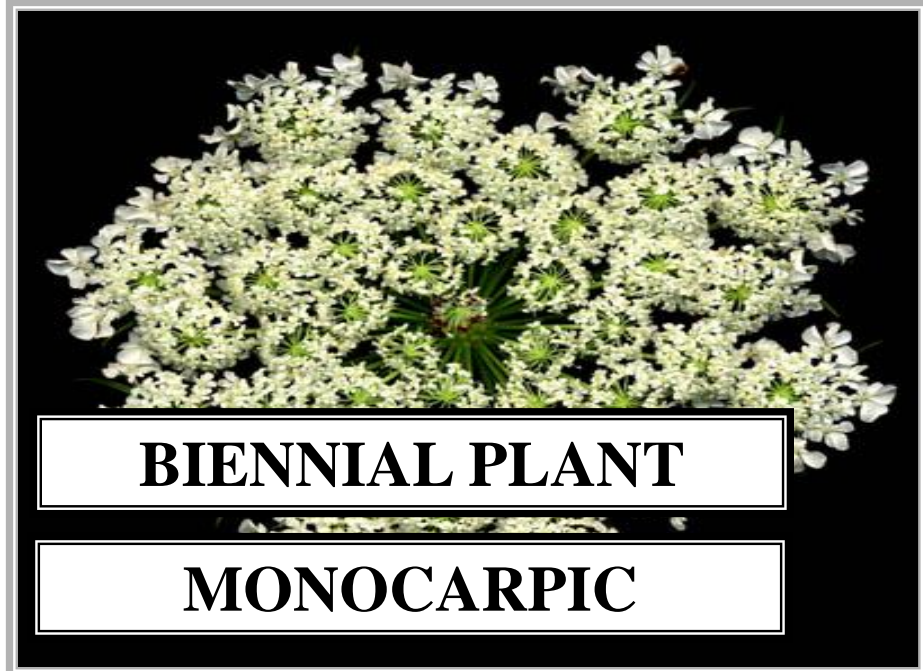




DEATH



QUEEN-ANN'S LACE



BIENNIAL PLANT

MONOCARPIC



HERBACEOUS TISSUE



QUEEN-ANN'S LACE



BIENNIAL PLANT

MONOCARPIC

PERENNIAL PLANT

PERENNIAL PLANT



**PERENNIAL
GROWTH HABIT**

**COMPLETES
LIFE CYCLE
2+ SEASONS**

**PERENNIAL
GROWTH HABIT**



HERBACEOUS PERENNIAL PLANT





HERBACEOUS TISSUE



SEASONAL HERB



BUTTERCUP



RHIZOME



BUTTERCUP



SHOOT

RHIZOME



BUTTERCUP

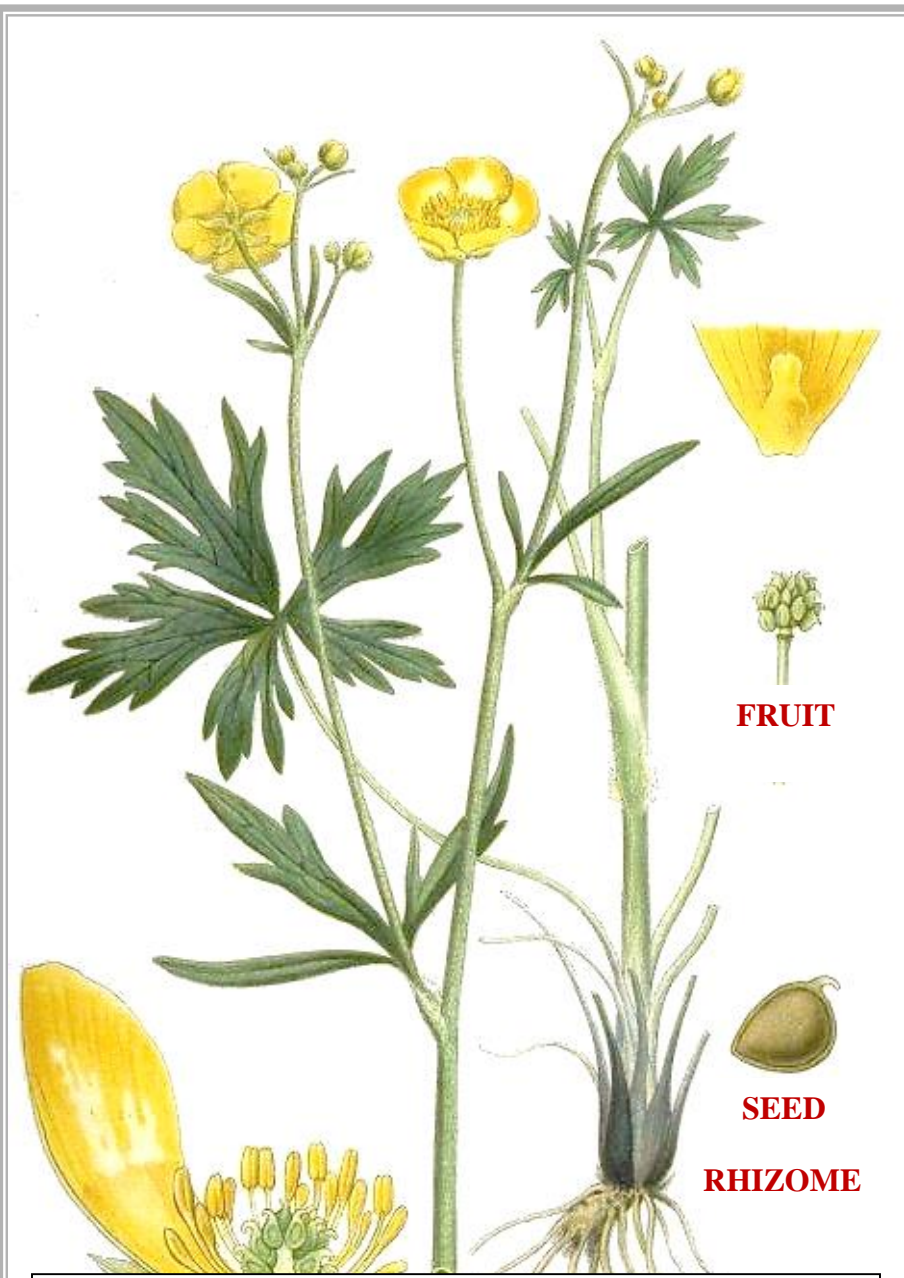


RHIZOME

FLOWER



BUTTERCUP



FRUIT

SEED

RHIZOME

FRUIT / SEED



D



BUTTERCUP



**RHIZOME
PERSISTS**

SHOOT DEATH



BUTTERCUP



**EXISTS MULTIPLE
SEASONS**



**RHIZOME
PERSISTS**

HERBACEOUS PERENNIAL



BUTTERCUP

POLYCARPIC

POLYCARPIC



**PLANT FLOWERS
MULTIPLE SEASONS
DURING LIFE CYCLE**

POLYCARPIC



POLYCARPIC

HERBACEOUS PERENNIAL



BUTTERCUP



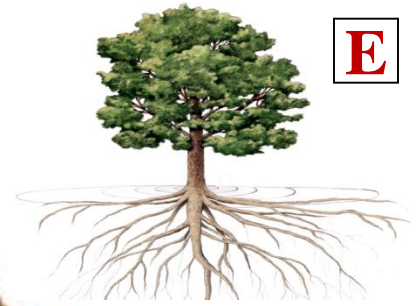
WOODY PERENNIAL PLANT



W

TULIP POPLAR

E



WOODY TISSUE



TULIP POPLAR

STEM

C.S.