

INTERNATIONAL COOPERATION ADMINISTRATION
UNITED STATES DEPARTMENT OF AGRICULTURE
AND LAND-GRANT COLLEGES COOPERATING
Washington 25, D. C.

INTERPRETATION OF GERMINATION TESTS

Presented By:

Seed Technology Laboratory
Mississippi Agricultural Experiment Station
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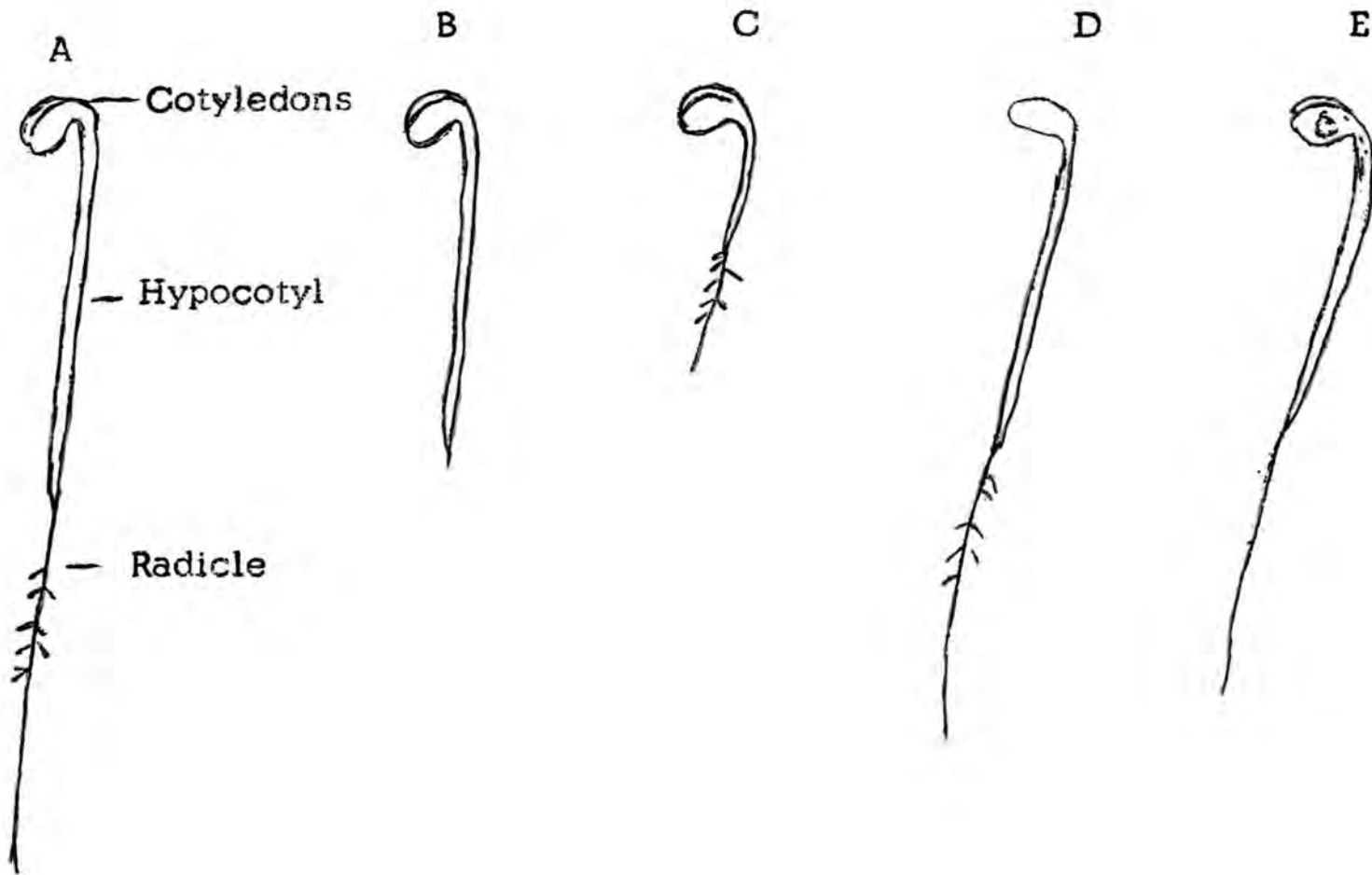
Far East Seed Improvement Training Course

Taichung, Taiwan

August 29 - September 24, 1960

FIGURE 1

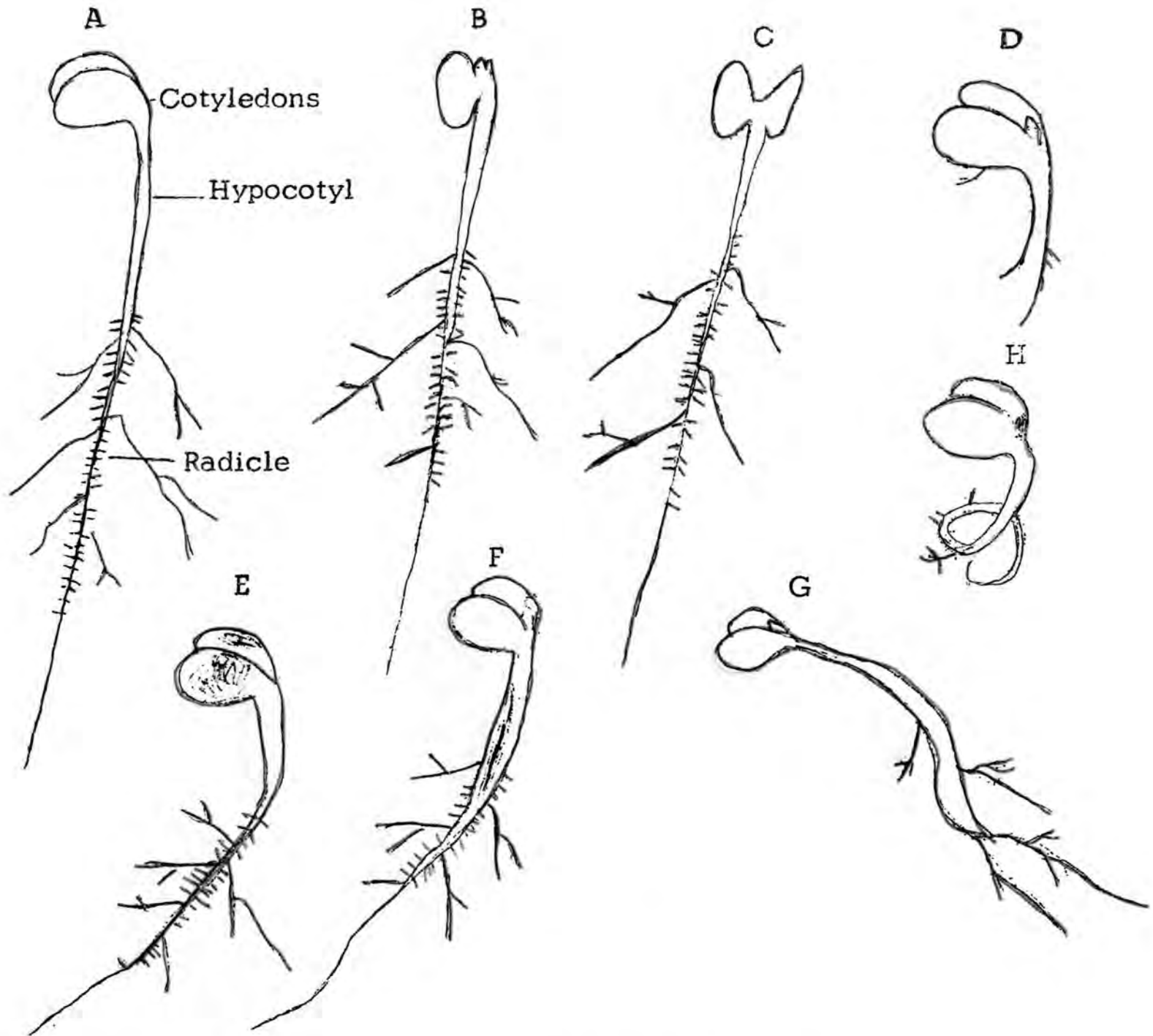
Seedlings of Lactuca spp.



- | | |
|------------------------|--|
| A. Normal seedling : | Hypocotyl and radicle well developed |
| B. Abnormal seedling : | No radicle |
| C. Abnormal seedling: | Hypocotyl and radicle shorter than 1/2 "normal length" |
| D. Abnormal seedling: | Only one cotyledon |
| E. Abnormal seedling : | Extensive necrotic area on cotyledons and hypocotyl |

FIGURE 2

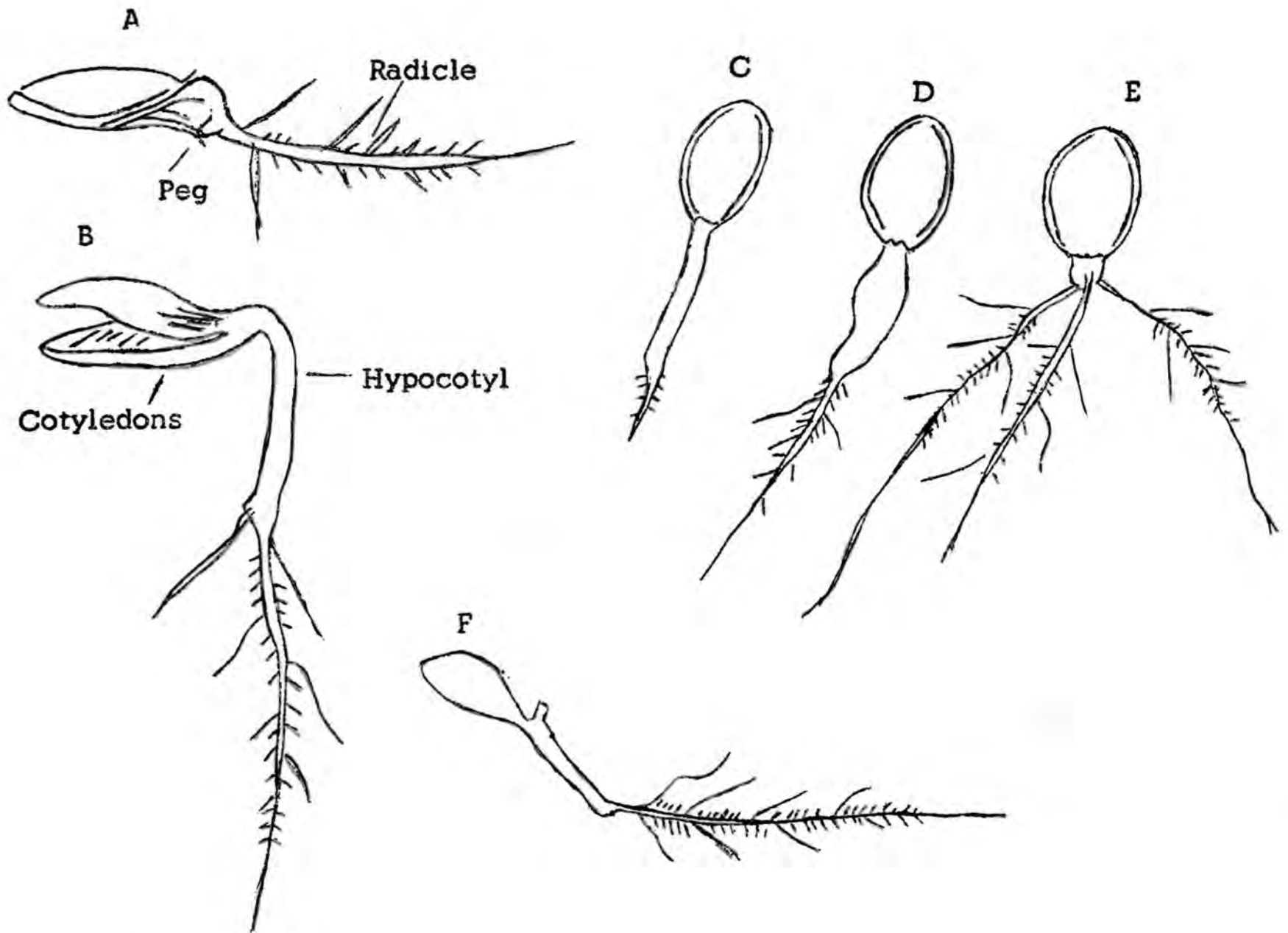
Seedlings of Brassica spp.



- | | |
|-----------------------|--|
| A. Normal seedling : | Good seedling development |
| B. Normal seedling : | One cotyledon; otherwise good seedling development |
| C. Abnormal seedling: | Growing point absent |
| D. Abnormal seedling: | Swollen hypocotyl; no radicle |
| E. Abnormal seedling: | 50% of area of cotyledons decayed |
| F. Abnormal seedling: | Split hypocotyl |
| G. Abnormal seedling: | Thickened hypocotyl; weak radicle |
| H. Abnormal seedling: | Weak radicle |

FIGURE 3

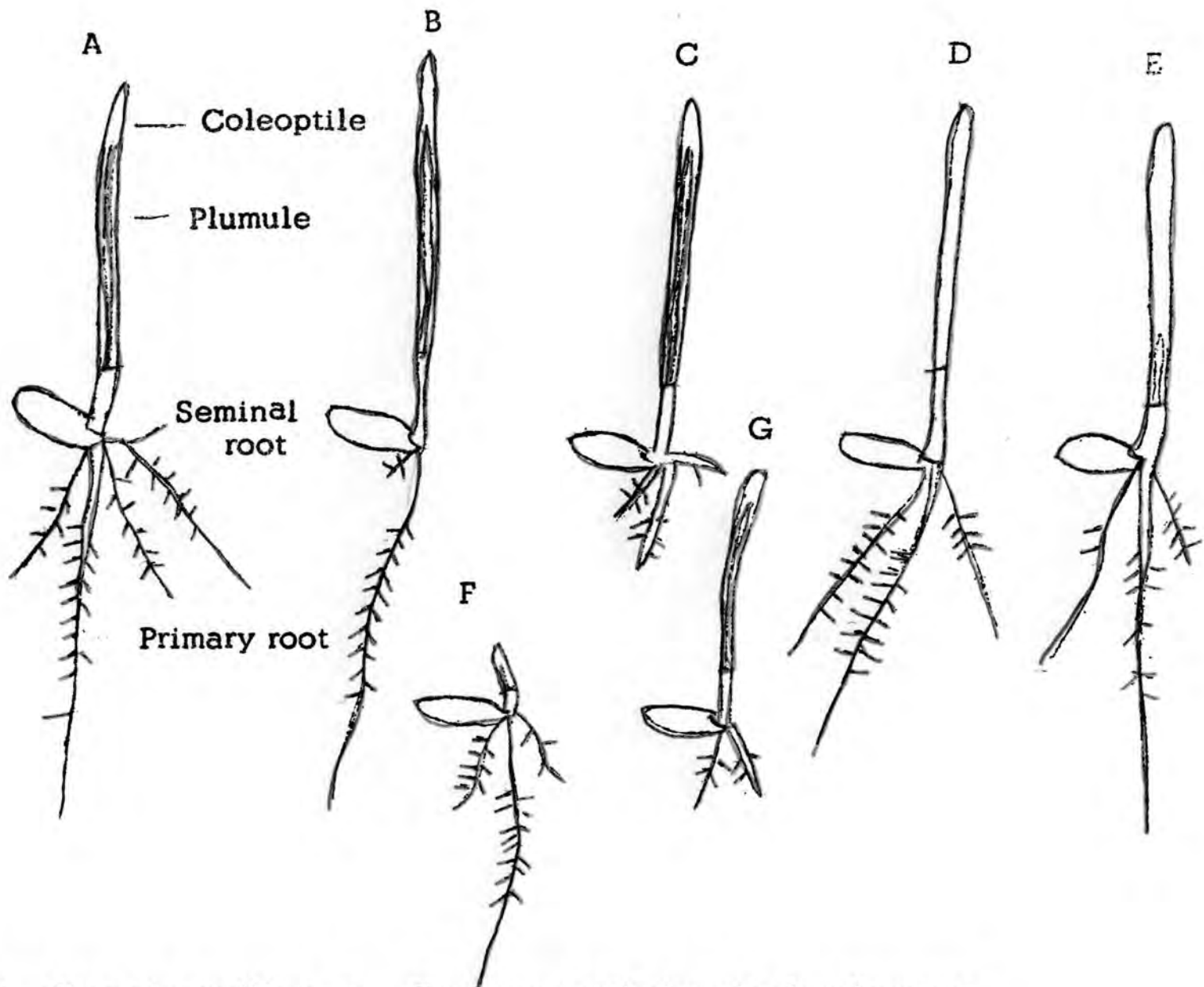
Seedlings of Citrullus spp.



- | | |
|---|--------------------------------------|
| A. Normal seedling (seedcoat on): | Good seedling development |
| B. Normal seedling (seedcoat off): | Good seedling development |
| C. Abnormal seedling: | Weak radicle development |
| D. Abnormal seedling: | Thickened hypocotyl |
| E. Abnormal seedling: | Shortened hypocotyl |
| F. Abnormal seedling: | Cotyledon and epicotyl absent |

FIGURE 4

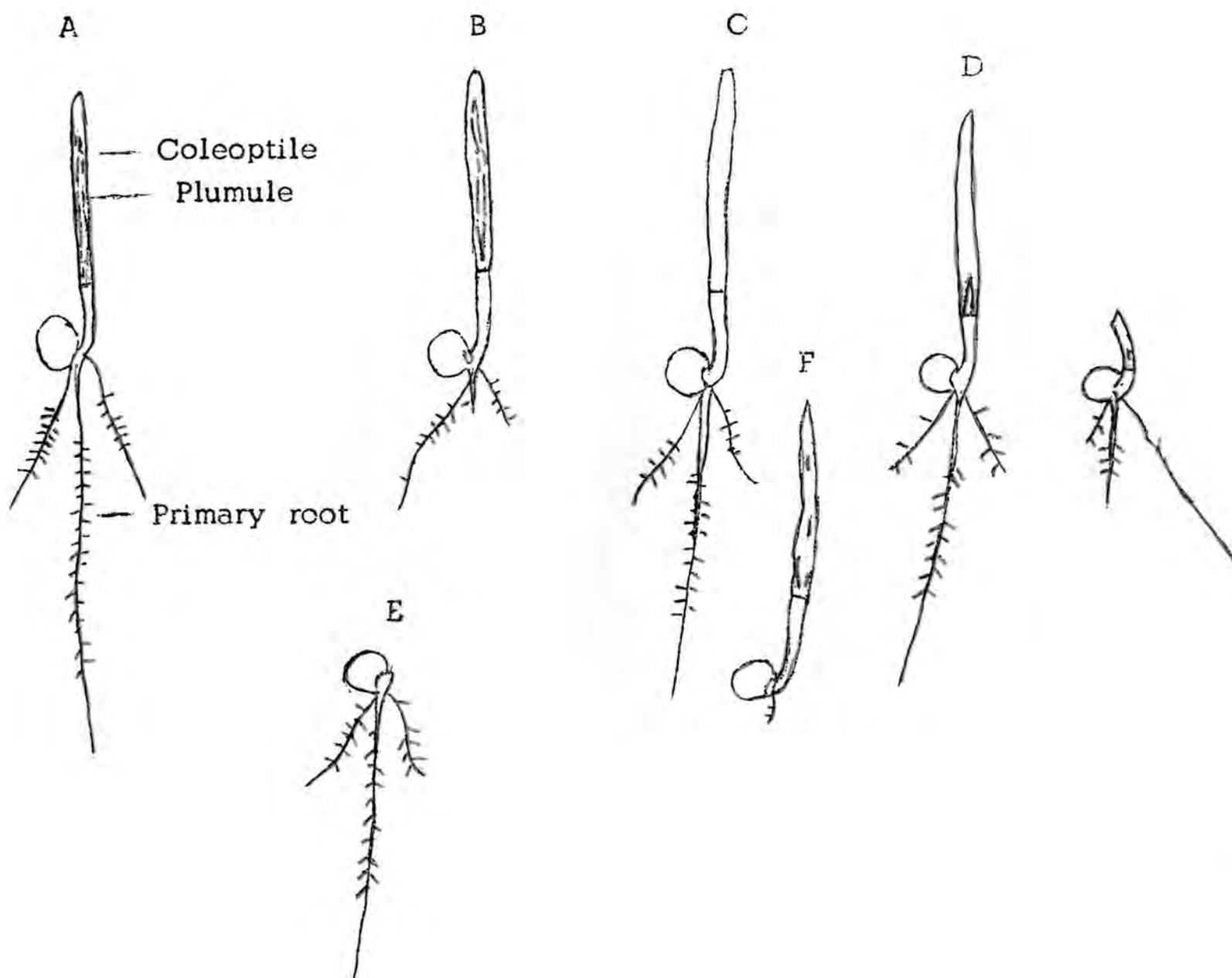
Seedlings of Triticum spp.



- | | |
|------------------------|---|
| A. Normal seedling : | Good root and plumule development |
| B. Normal seedling : | One well developed seminal root |
| C. Abnormal seedling: | Roots thickened and shortened |
| D. Abnormal seedling: | Empty coleoptile |
| E. Abnormal seedling : | Plumule less than one-half length of coleoptile |
| F. Abnormal seedling : | Weak plumule |
| G. Abnormal seedling : | Weak roots |

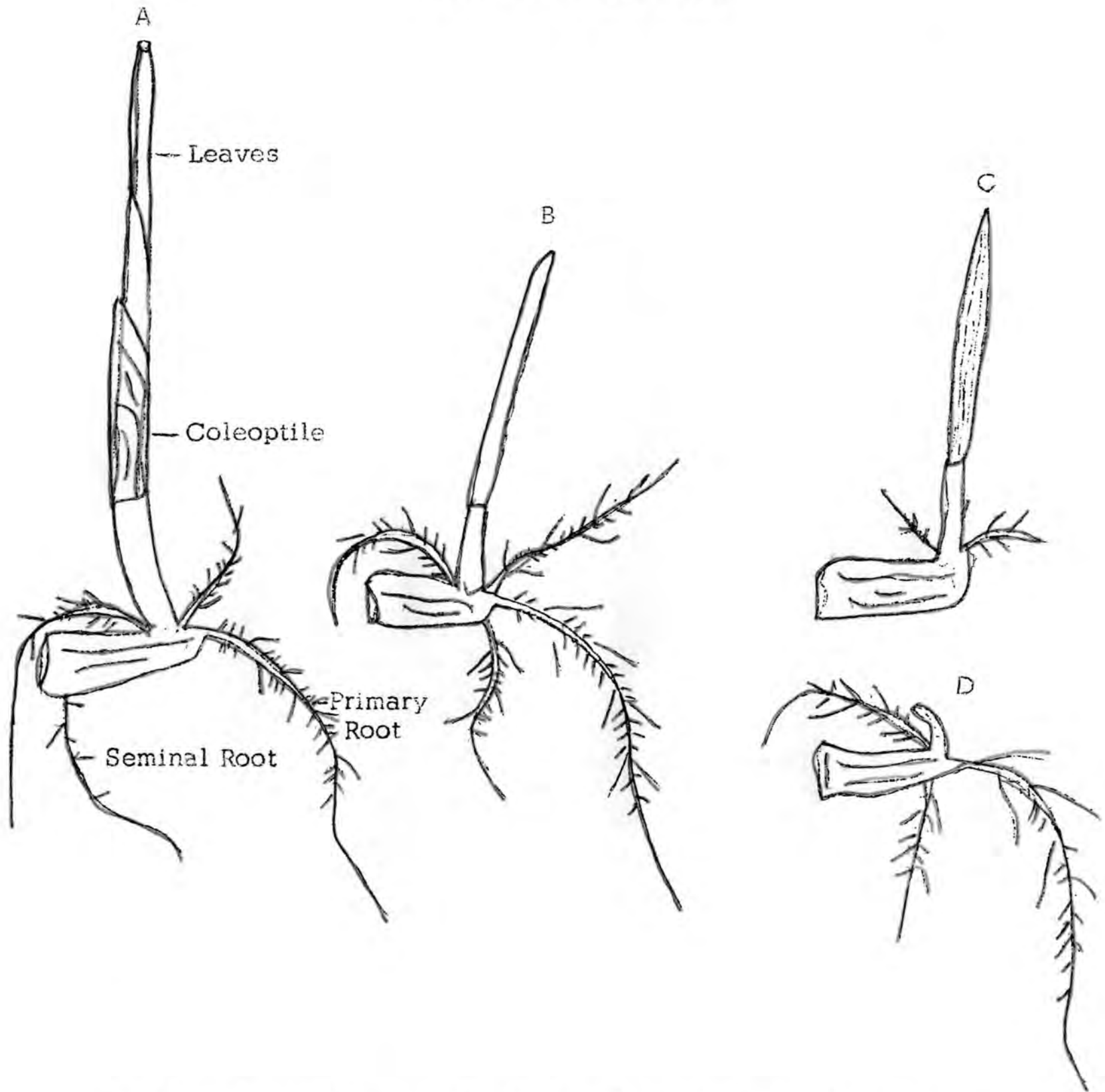
FIGURE 5

Seedlings of Sorghum spp.



- A. Normal seedling : Well developed roots and plumule
- B. Abnormal seedling : weak roots
- C. Abnormal seedling: Empty coleoptile
- D. Abnormal seedling: Plumule less than one-half length of coleoptile
- E. Abnormal seedling : No coleoptile and plumule
- F. Abnormal seedling : No roots

FIGURE 6
Seedlings of Zea Mays

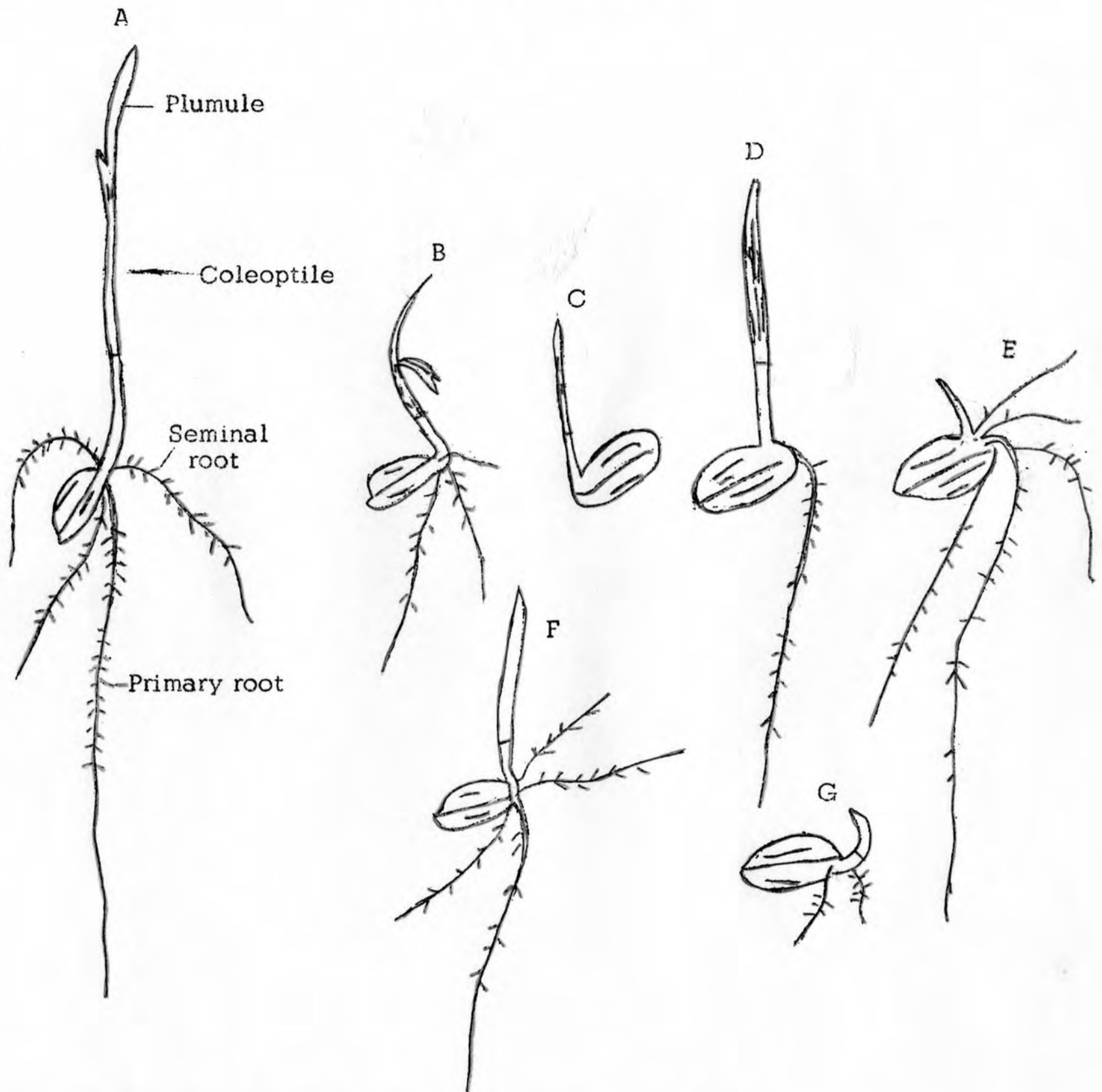


- A. Normal seedling : Good plumule and root development
- B. Abnormal seedling : Empty coleoptile
- C. Abnormal seedling: Weak root development
- D. Abnormal seedling: Small, weak plumule

Note: Aged seed weak and slow germinating.

FIGURE 7

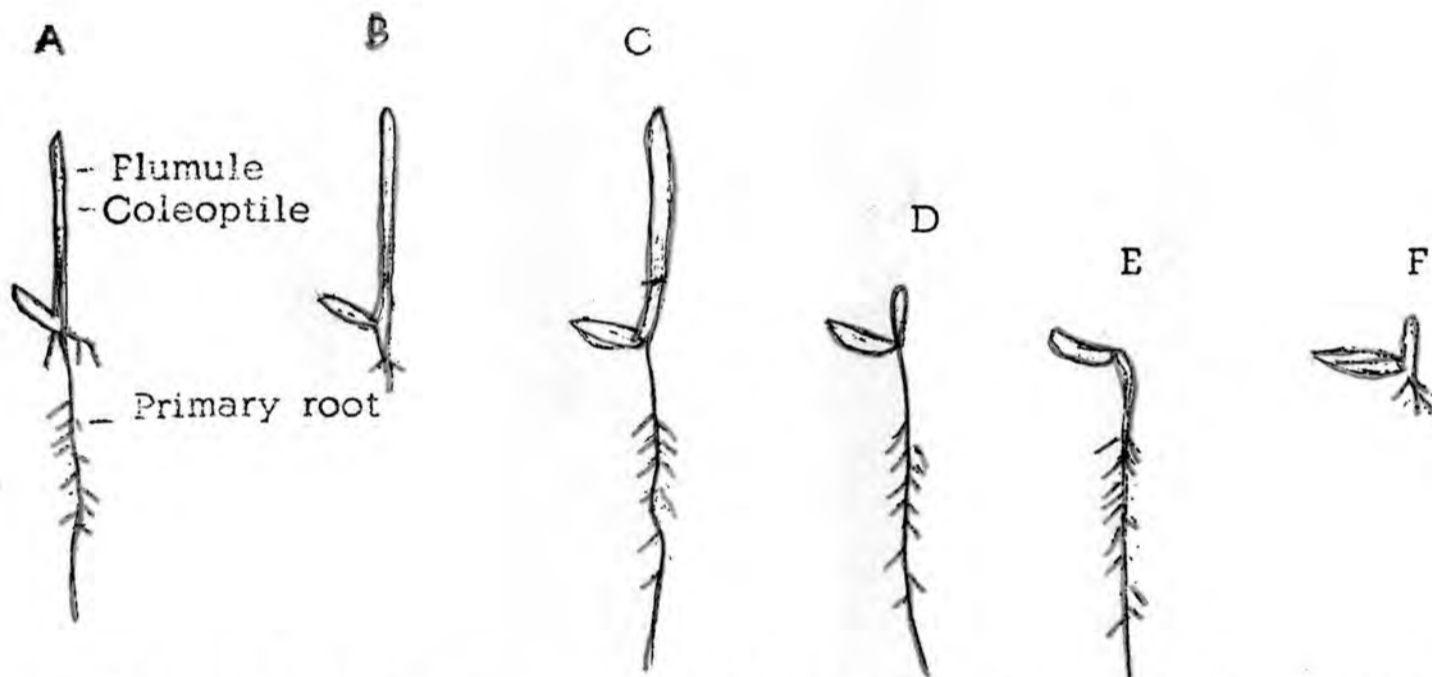
Seedlings of Oryza sativa



- A. Normal seedling : Plumule, roots well developed
- B. Abnormal seedling: Weak plumule and roots
- C. Abnormal seedling: No roots
- D. Abnormal seedling: Only one root.
- E. Abnormal seedling: weak plumule - coleoptile empty
- F. Abnormal seedling: No plumule
- G. Abnormal seedling: weak plumule and root development.

FIGURE 8

Seedlings of Poa spp.

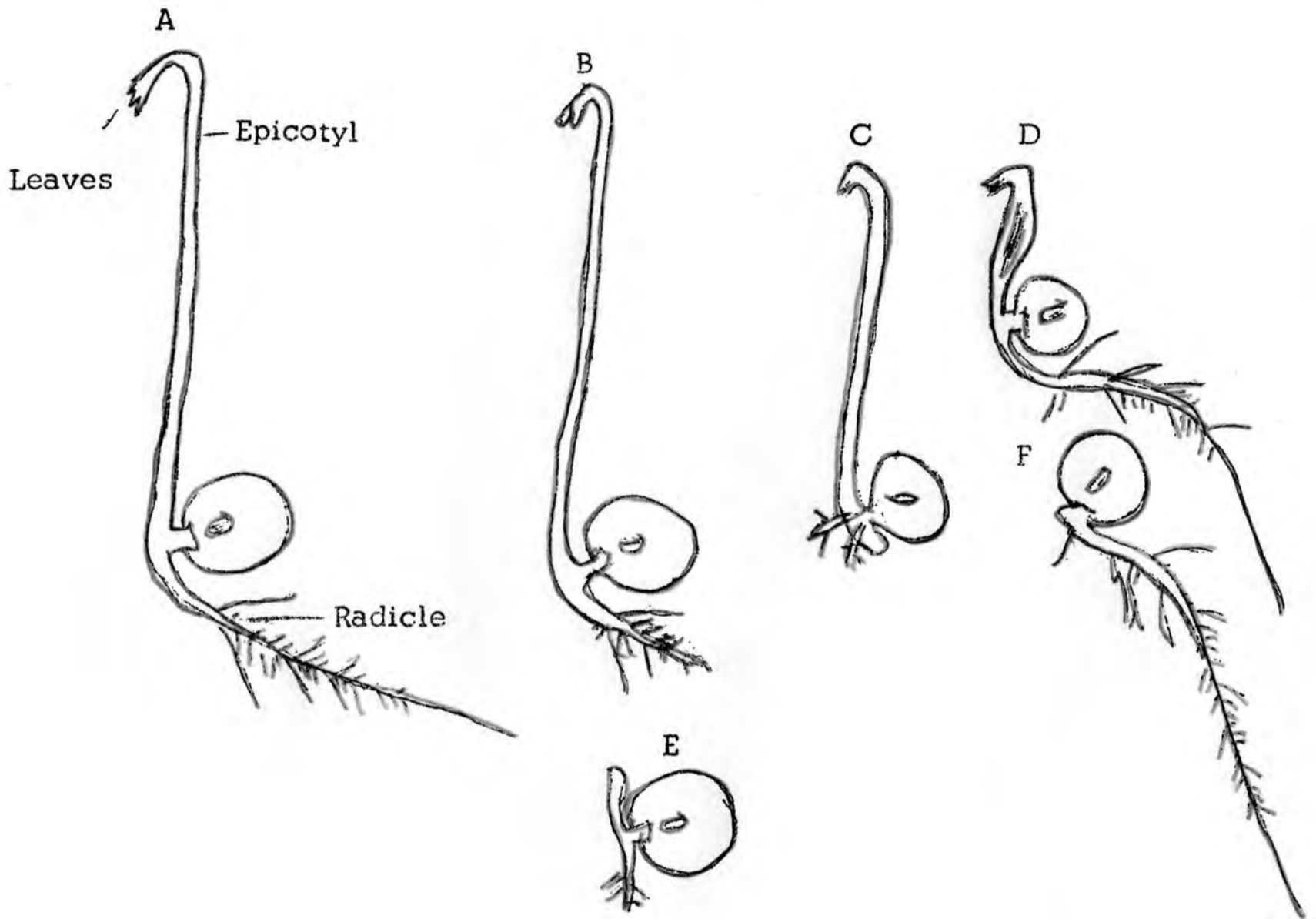


- A. Normal seedling :
- B. Abnormal seedling:
- C. Abnormal seedling:
- D. Abnormal seedling:
- E. Abnormal seedling:
- F. Abnormal seedling:

Plumule and primary root well developed
Weak primary root
Plumule less than one-half length of coleoptile
Weak plumule
No plumule and coleoptile
Weak plumule and root

FIGURE 9

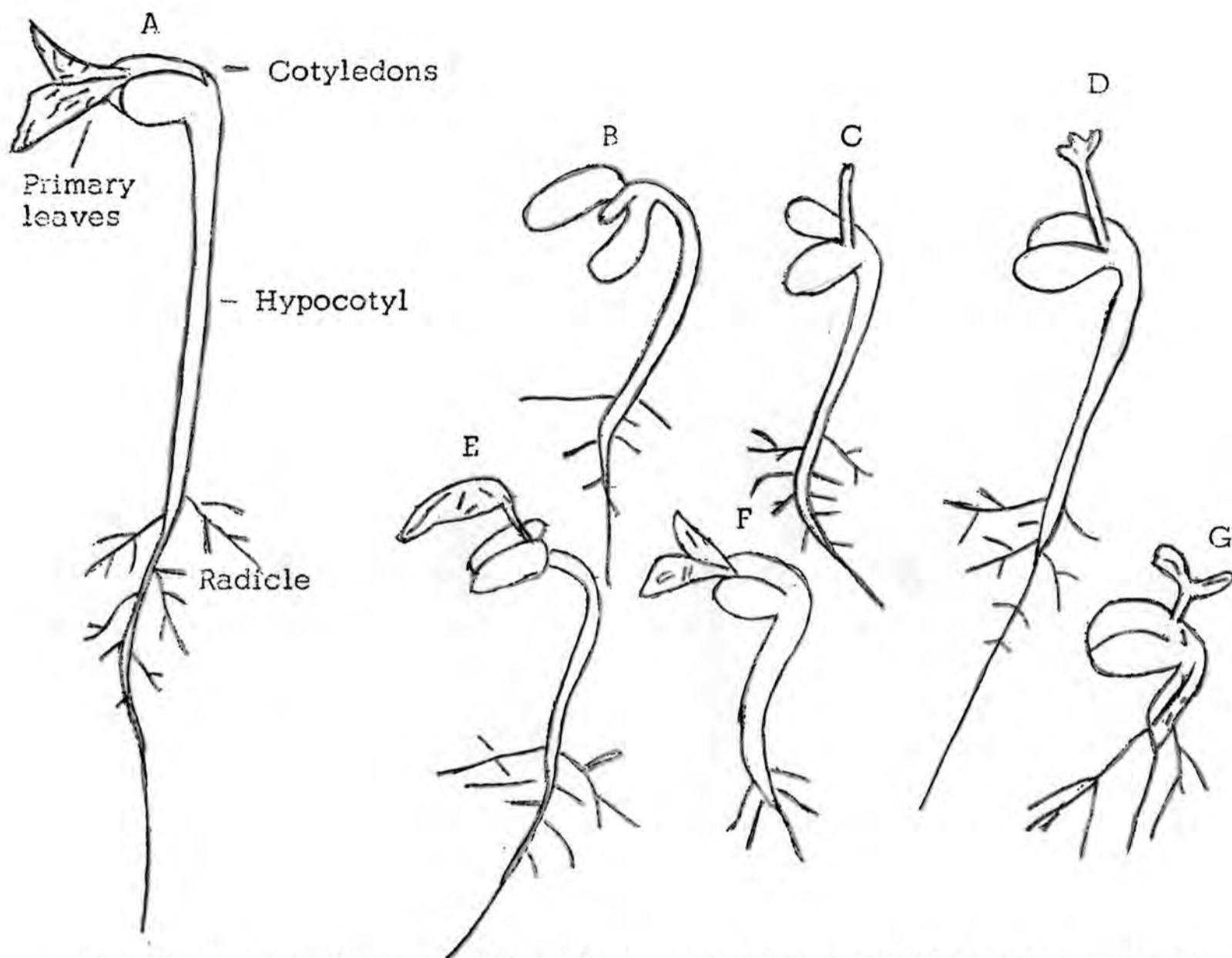
Seedlings of Pisum Sativum



- | | |
|------------------------|---------------------------------------|
| A. Normal seedling : | Good epicotyl and radicle development |
| B. Abnormal seedling: | Stunted radicle |
| C. Abnormal seedling: | No radicle development |
| D. Abnormal seedling: | Split, swollen epicotyl |
| E. Abnormal seedling : | Weak epicotyl and radicle |
| F. Abnormal seedling : | No epicotyl |

FIGURE 10

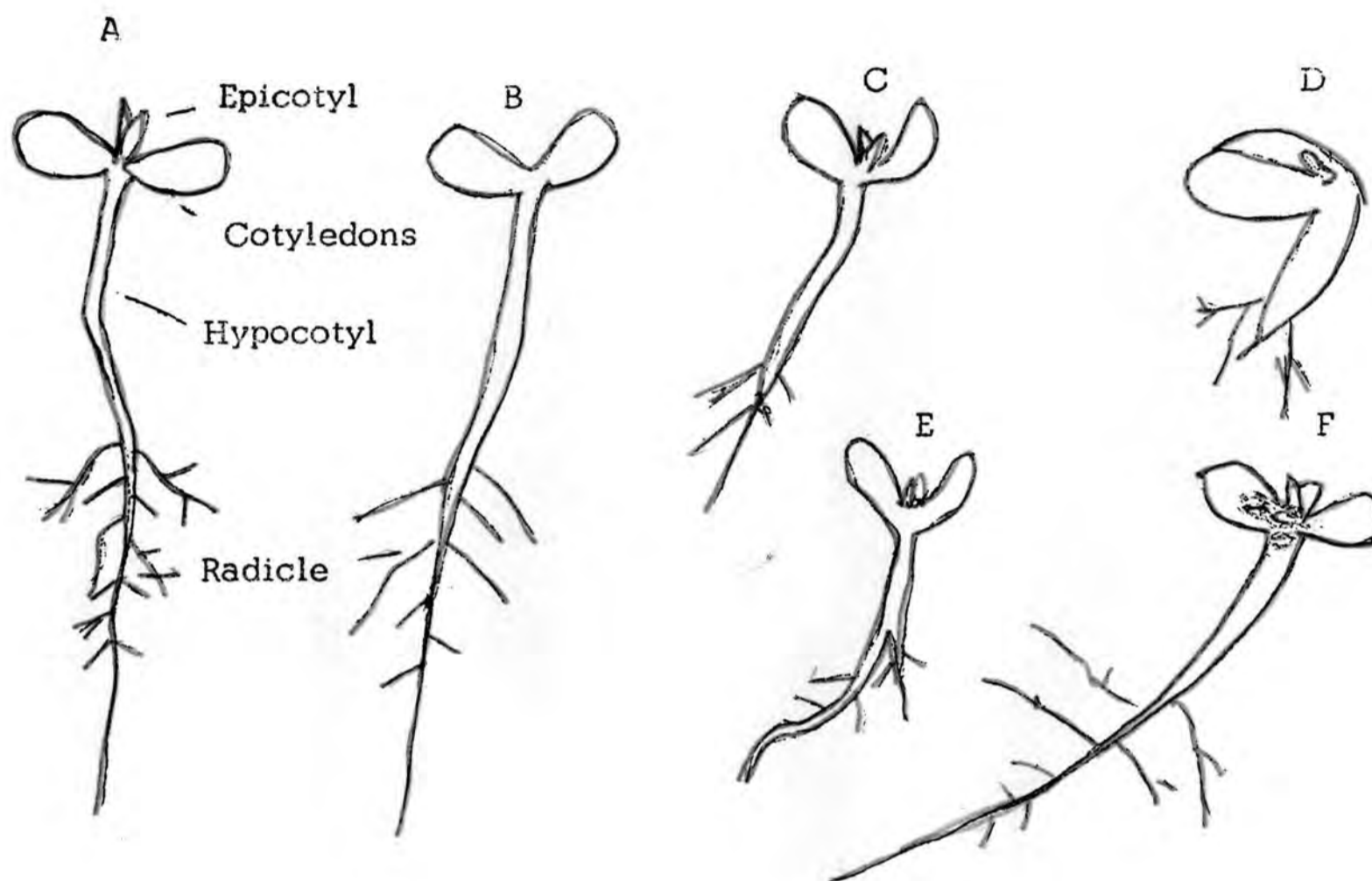
Seedlings of Phaseolus vulgaris



- A. Normal seedling : Epicotyl, hypocotyl and radicle well developed
- B. Abnormal seedling: Bald-head - no terminal bud ; no primary leaves
- C. Abnormal seedling: Terminal bud present but no primary leaves
- D. Abnormal seedling: Primary leaves chlorotic, stunted.
- E. Normal seedling : One primary leaf present
- F. Abnormal seedling: Hypocotyl thickened; no radicle
- G. Abnormal seedling: Hypocotyl weak; no radicle

FIGURE 11

Seedlings of Soja max

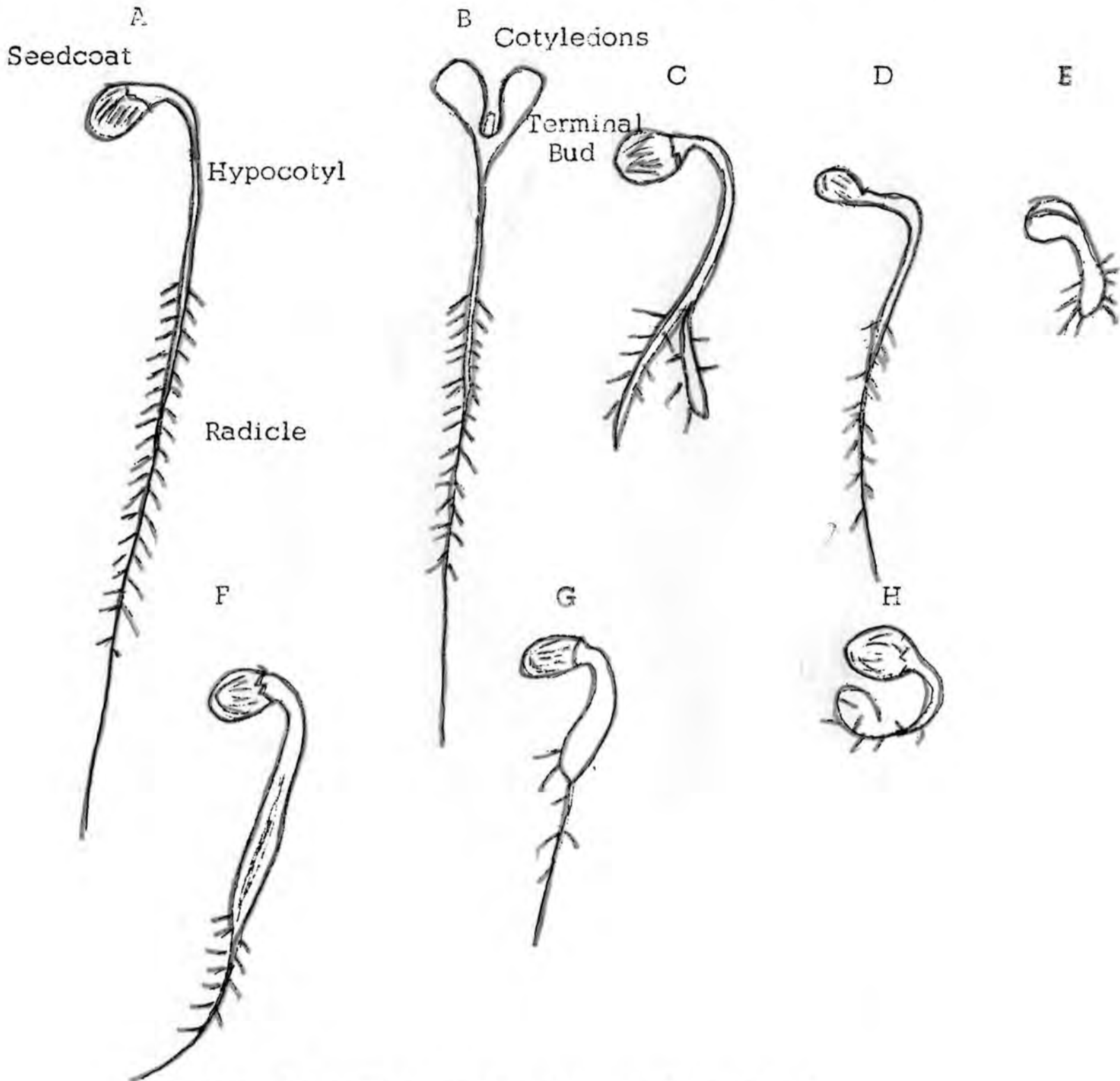


- A. Normal seedling : Epicotyl, hypocotyl and radicle well developed
- B. Abnormal seedling: No epicotyl
- C. Abnormal seedling: Radicle poorly developed
- D. Abnormal seedling: Hypocotyl short, thickened; no radicle
- E. Abnormal seedling : Split hypocotyl
- F. Abnormal seedling : Cotyledons and epicotyl decayed

FIGURE 12

Seedlings of Trifolium incarnatum

(Other small seeded legumes are similar)

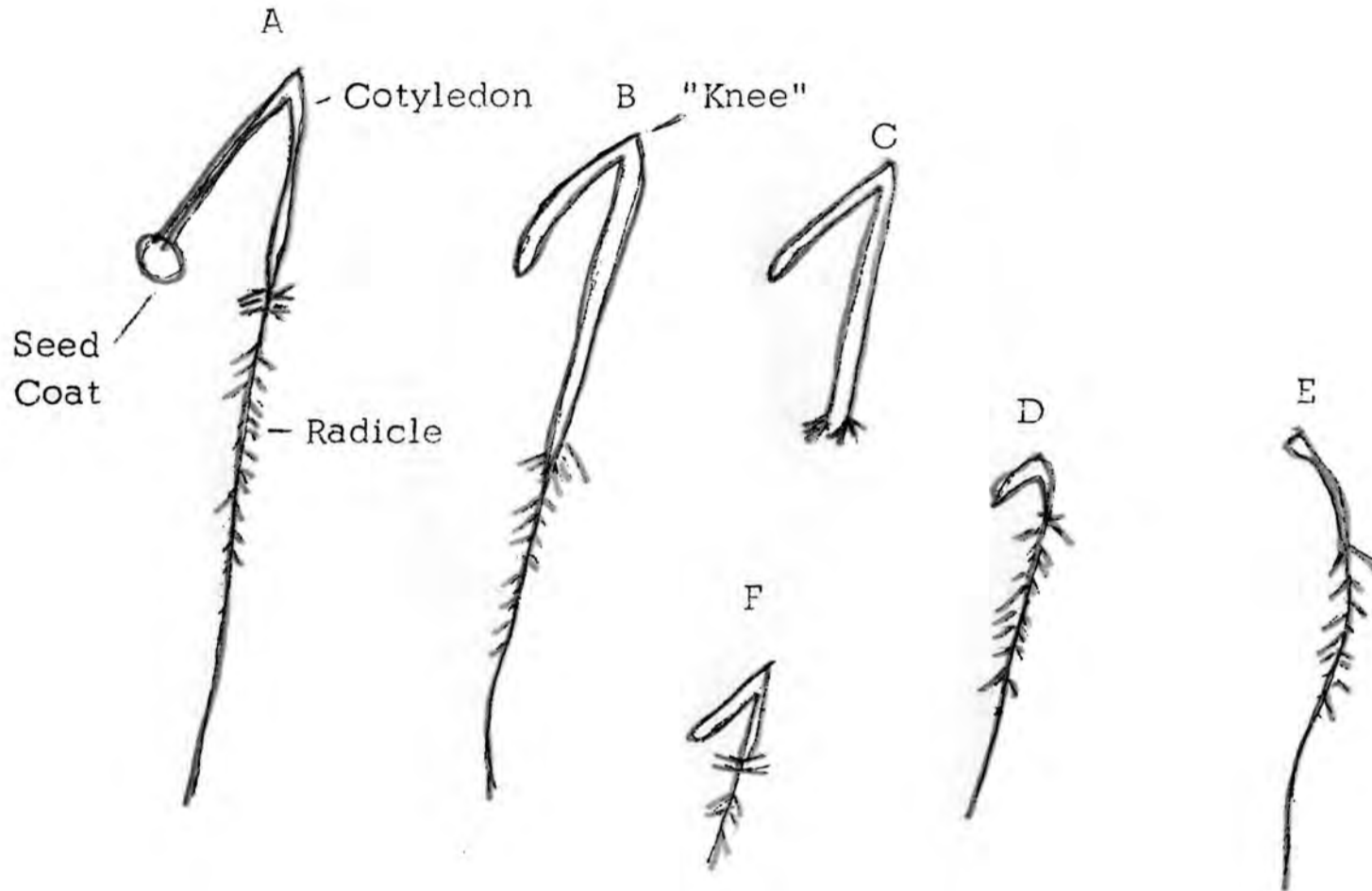


- A. Normal seedling : Seedcoat still attached
- B. Normal seedling : Cotyledons open
- C. Abnormal seedling: Split radicle
- D. Abnormal seedling: Cotyledons broken from stem
- E. Abnormal seedling: Blunt hypocotyl
- F. Abnormal seedling: Split hypocotyl
- G. Abnormal seedling: Swollen hypocotyl; small radicle
- H. Abnormal seedling: Curled stunted hypocotyl and radicle

Note: Check for "watery-transparent" sprouts.

FIGURE 13

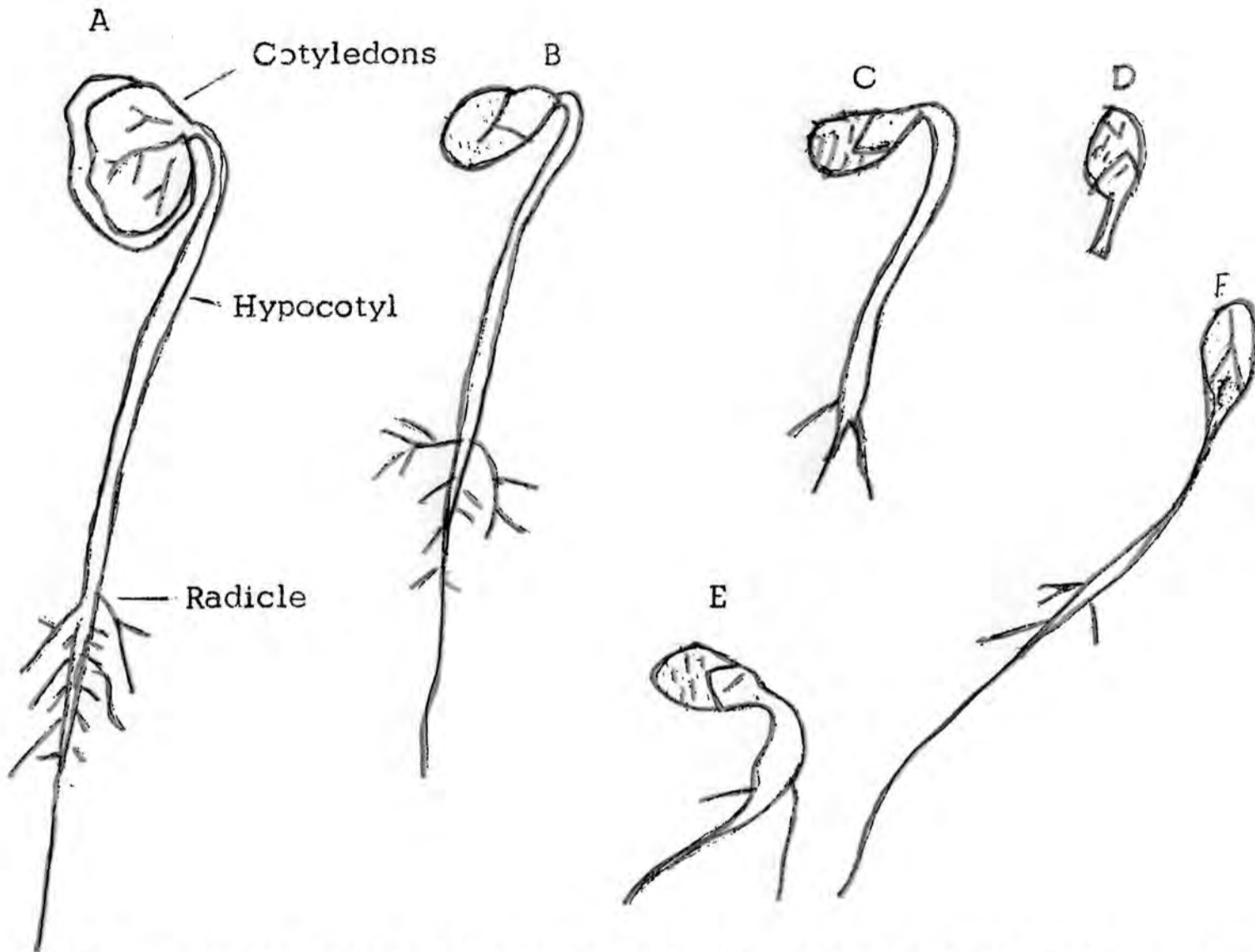
Seedlings of Allium spp.



- | | |
|--|---|
| A. Normal seedling (with seedcoat on): | Cotyledon "bent", long; root well developed |
| B. Normal seedling (with seedcoat on): | Cotyledon "bent", long; root well developed |
| C. Abnormal seedling: | No radicle |
| D. Abnormal seedling: | Cotyledon short, weak |
| E. Abnormal seedling: | Indefinite "knee" |
| F. Abnormal seedling: | Weak radicle |

FIGURE 14

Seedlings of Gossypium spp.



- A. Normal seedling (seedcoat off): Hypocotyl, radicle and cotyledons well developed.
- B. Normal seedling (seedcoat on): Same as above.
- C. Abnormal seedling: Radicle failed to develop.
- D. Abnormal seedling: Hypocotyl not elongated; radicle missing.
- E. Abnormal seedling: Hypocotyl thickened; radicle weak
- F. Abnormal seedling: Hypocotyl decayed; base of cotyledons decayed.