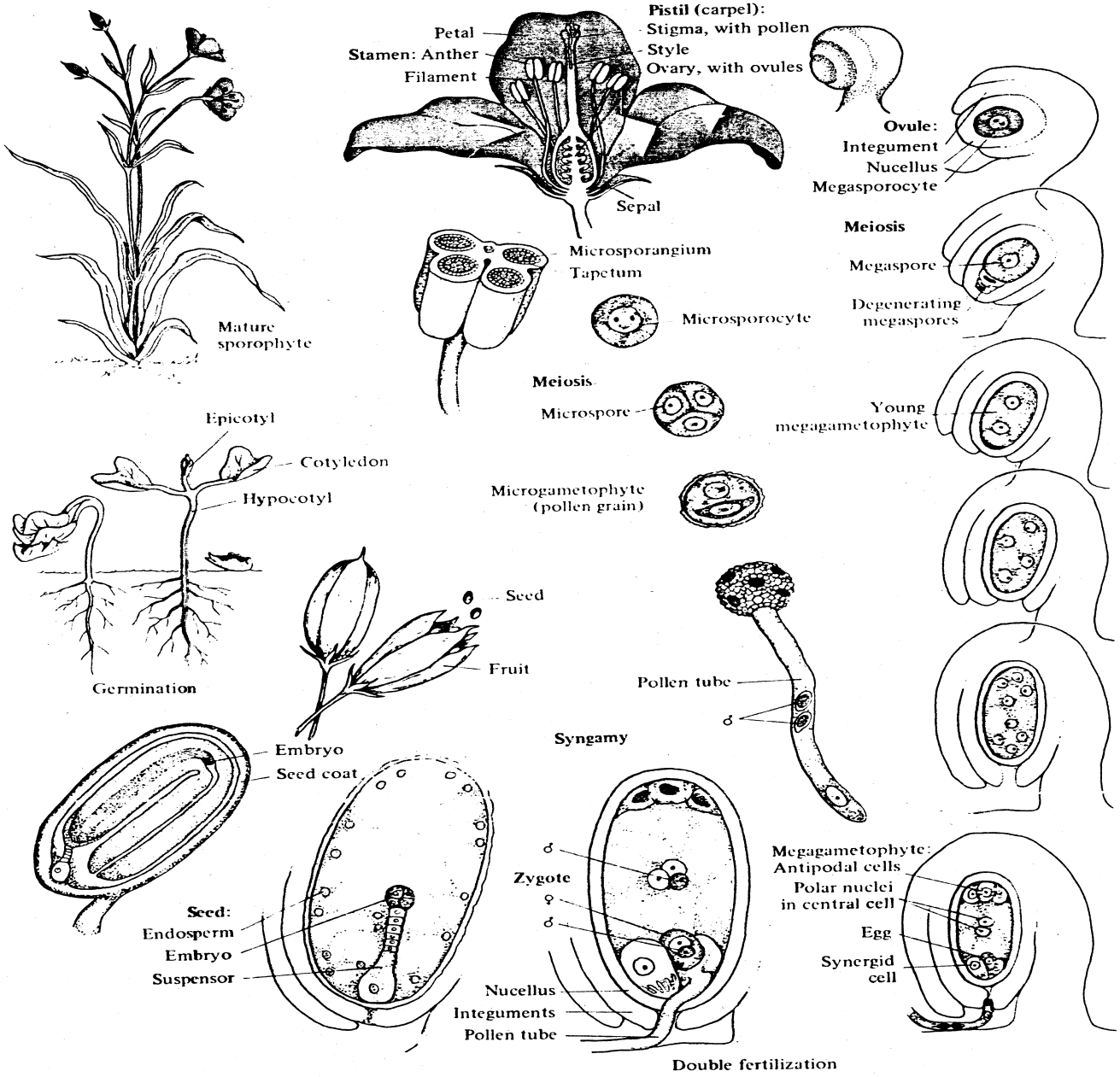
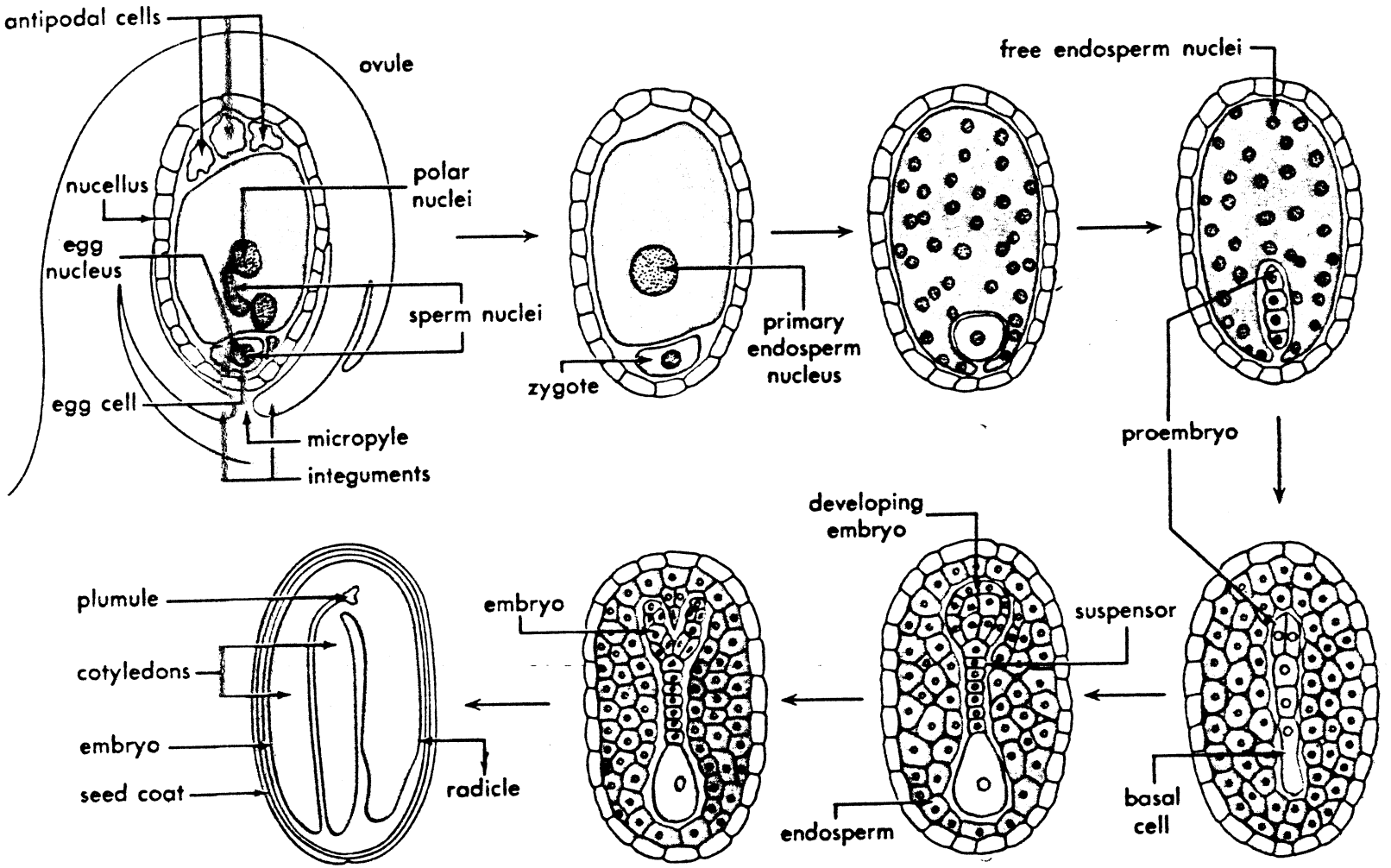
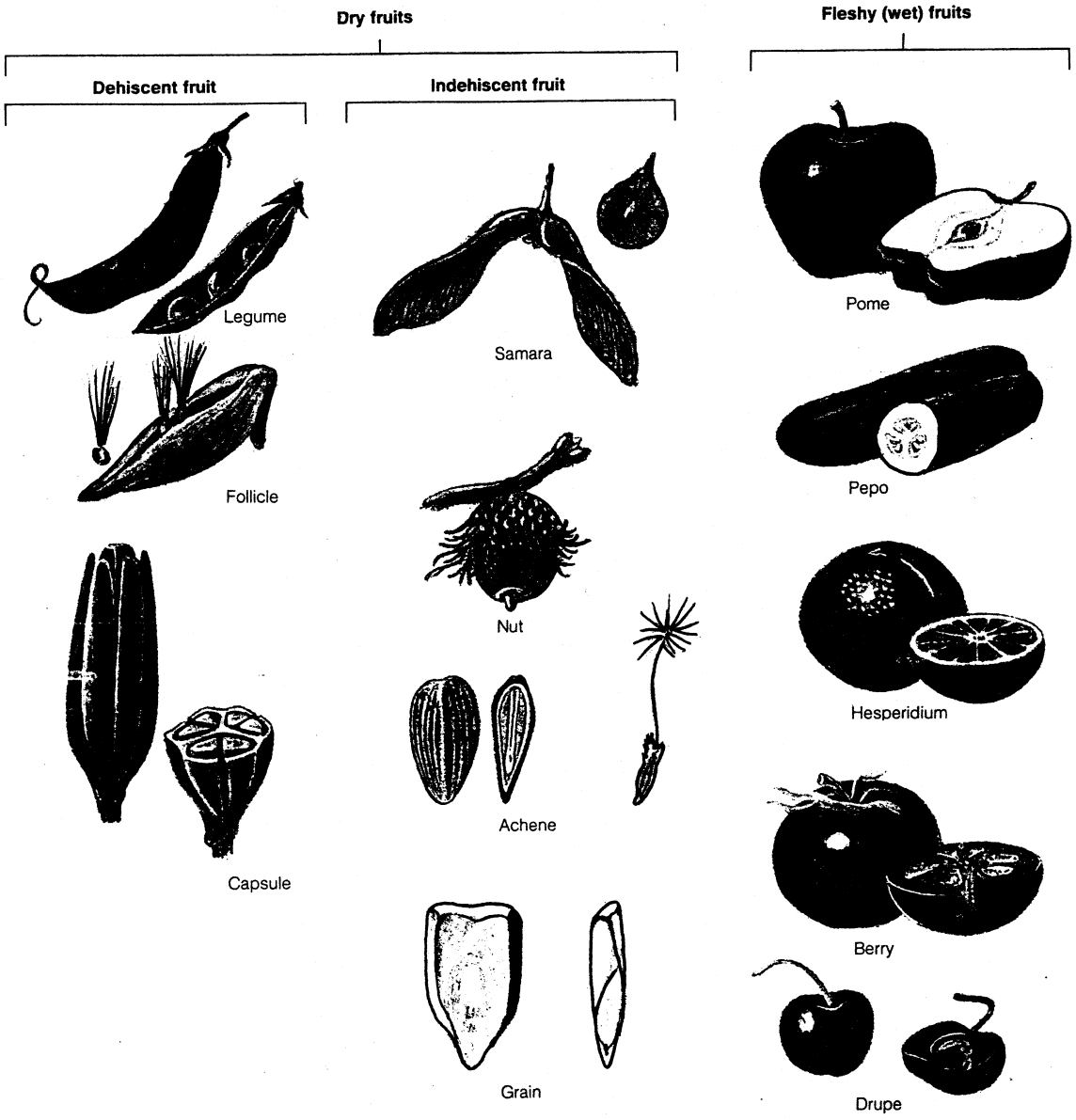
Seed-borne diseases


Mature sporophyte
Petal
Stamen: Anther
Filament
Pistil (carpel):
Stigma, with pollen
Style
Ovary, with ovules
Sepal
Microsporangium
Tapetum
Microsporocyte
Meiosis
Microspore
Microgametophyte (pollen grain)
Ovule:
Integument
Nucellus
Megasporocyte
Meiosis
Megaspore
Degenerating megaspores
Young megagametophyte
Epicotyl
Cotyledon
Hypocotyl
Germination
Seed
Fruit
Pollen tube
Embryo
Seed coat
Seed:
Endosperm
Embryo
Suspensor
Syngamy
Zygote
Nucellus
Integuments
Pollen tube
Double fertilization
Megagametophyte:
Antipodal cells
Polar nuclei in central cell
Egg
Synergid cell


antipodal cells
ovule
nucellus
polar nuclei
egg nucleus
sperm nuclei
egg cell
micropyle
integuments
zygote
primary endosperm nucleus
free endosperm nuclei
proembryo
developing embryo
suspensor
basal cell
endosperm
embryo
plumule
cotyledons
embryo
seed coat
radicle

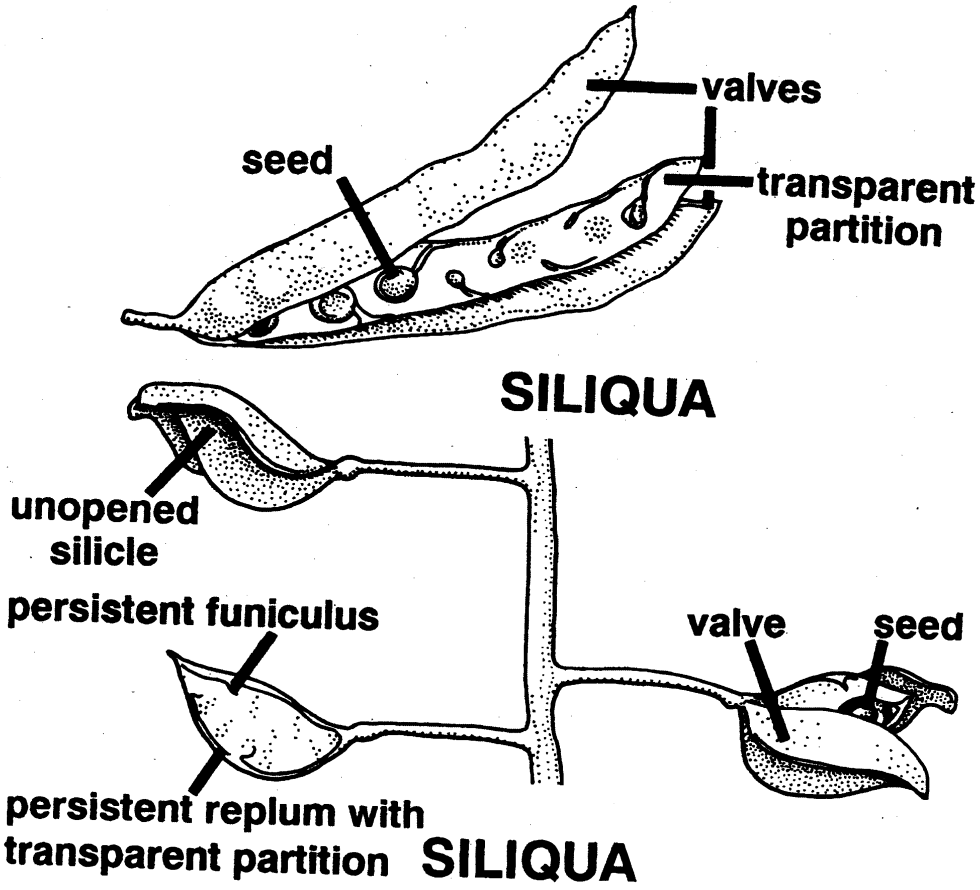
Examples of different types of fruits.

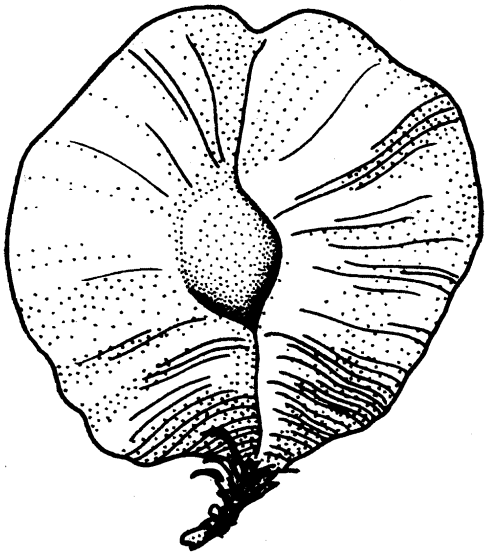


Dry Fruits

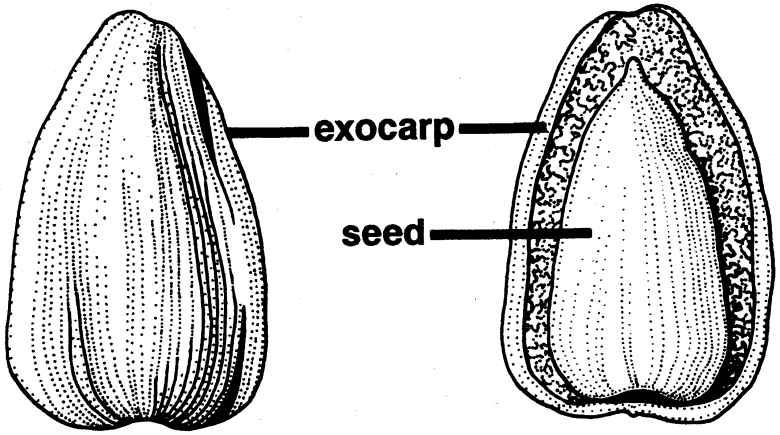
Follicle	**Dry fruit that splits open along one seam to release seeds**	**milkweed**
Legume	**Dry fruit that splits open along two seams**	**pea, bean, lentil,carrot, peanut**
Achene	**Dry fruit that does not split open at maturity; single seed attached to the pericarp only at its base**	**sunflower**
Nut*	**Dry fruit that does not split open at maturity; one-seeded fruits with thickened woody or stony walls as a wing that aids in dispersal**	**hazelnut, chestnut**

Grain	**Dry fruit that does not split open at maturity; single seed (Caryopsis) is fused to the pericarp and cannot be separated from it**	**wheat, rice, oats, barley, corn**
Samara	**Dry fruit that does not split open at maturity; pericarp extends out**	**elm, maple**


valves
seed
transparent partition
SILIQUA
unopened silicle
persistent funiculus
valve
seed
persistent replum with transparent partition
SILIQUA



SAMARA



ACHENE

Quality of seed lot

- A seed lot is a living product
- A seed lot is a genuine product
- A seed lot is a pure product
- A seed lot is a healthy product

Factors affecting seed health

- Physiological disorder
- Seed-borne pathogens
- Conditions of processing

Types of damages caused by seed-borne pathogens

- Seed abortion
- Reduced seed size
- Seed rot
- Sclerotisation and stromatization
- Seed discoloration
- Reduced or elimination of germination
- Alterration in seed

Ergot of rye
Claviceps purpurea

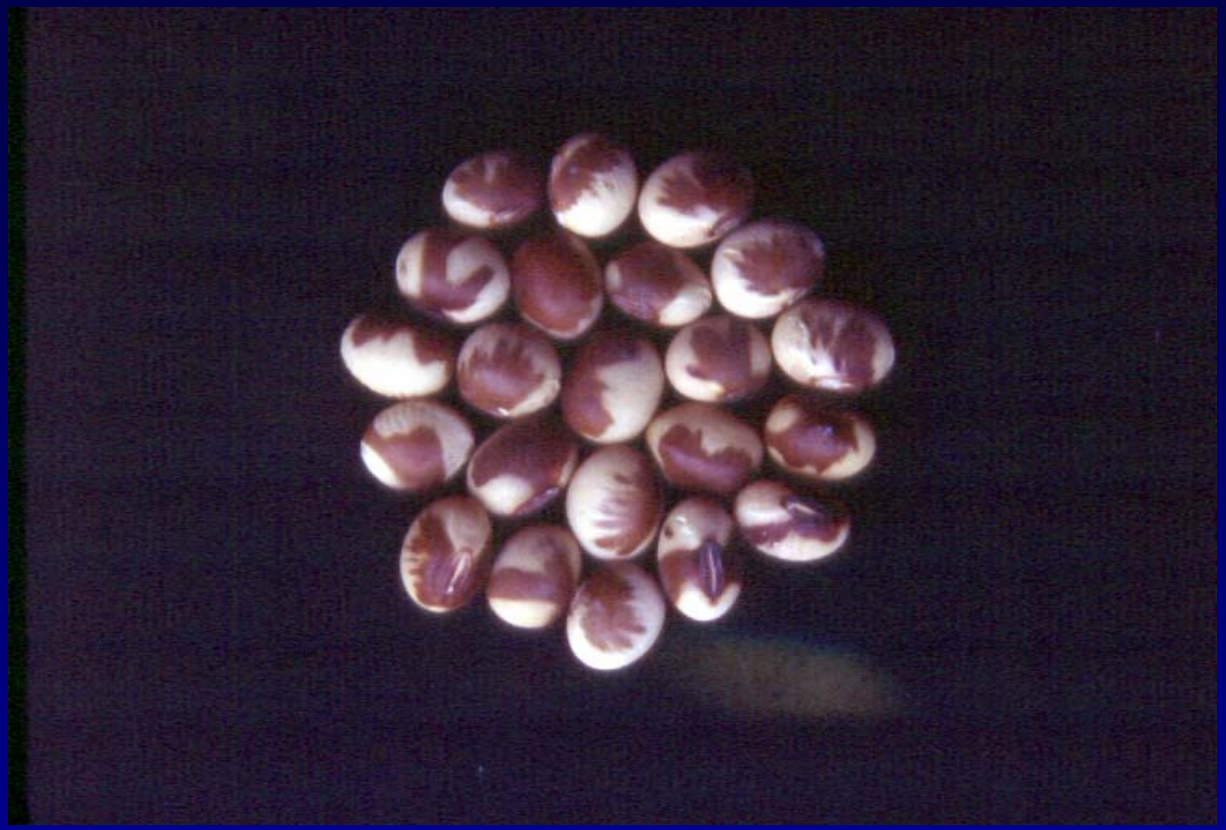
Loose smut of barley
Ustilago nuda

Lasiodiplodia

Downy mildew of soybean
Peronospora manshurica

Purple stain of soybean

Cercospora kikuchii



Soybean Mosaic Virus

Seed discoloration


Marsh spot


Hollow heart

Significance of seed-borne diseases

- Prolonged transmissibility
- Maximum infection
- Dissemination over long distance
- Introduction to new area and infected new soil
- Preferential selection toward pathogenic strains
- Random infection foci in seed production field
- Increase seed transmission on plant grown from infected seed

Viability of seedborne fungal pathogens after storage at –20°C

Fungus	Host	No. of samples	Storage period (years)	Seeds infected (%)	
				Start	End
Ascochyta pisi	Pea	8	8–11	18	14
Ascochyta fabae	Vicia bean*	5	9–13	14	14
Pleospora betae	Sugarbeet	2	14	30	23
Leptosphaeria nodorum	Wheat	9	9–14	50	39
Micronectriella nivalis	Wheat, rye, barley	5	9–12	19	19
Cochliobolus sativus	Wheat, barley	9	8–12	43	33
Pyrenophora teres	Barley	5	8–12	24	16
Pyrenophora graminea	Barley	4	11–12	47	44
Colletotrichum lindemuthianum	Phaseolus bean†	1	12	99	93
Ascochyta boltshauseri	Phaseolus bean	1	12	52	41
Leptosphaeria maculans	Cabbage	1	11–13	13	12
Alternaria dauci	Carrot	4	9–14	22	21
Alternaria radicina	Carrot	3	14	37	28

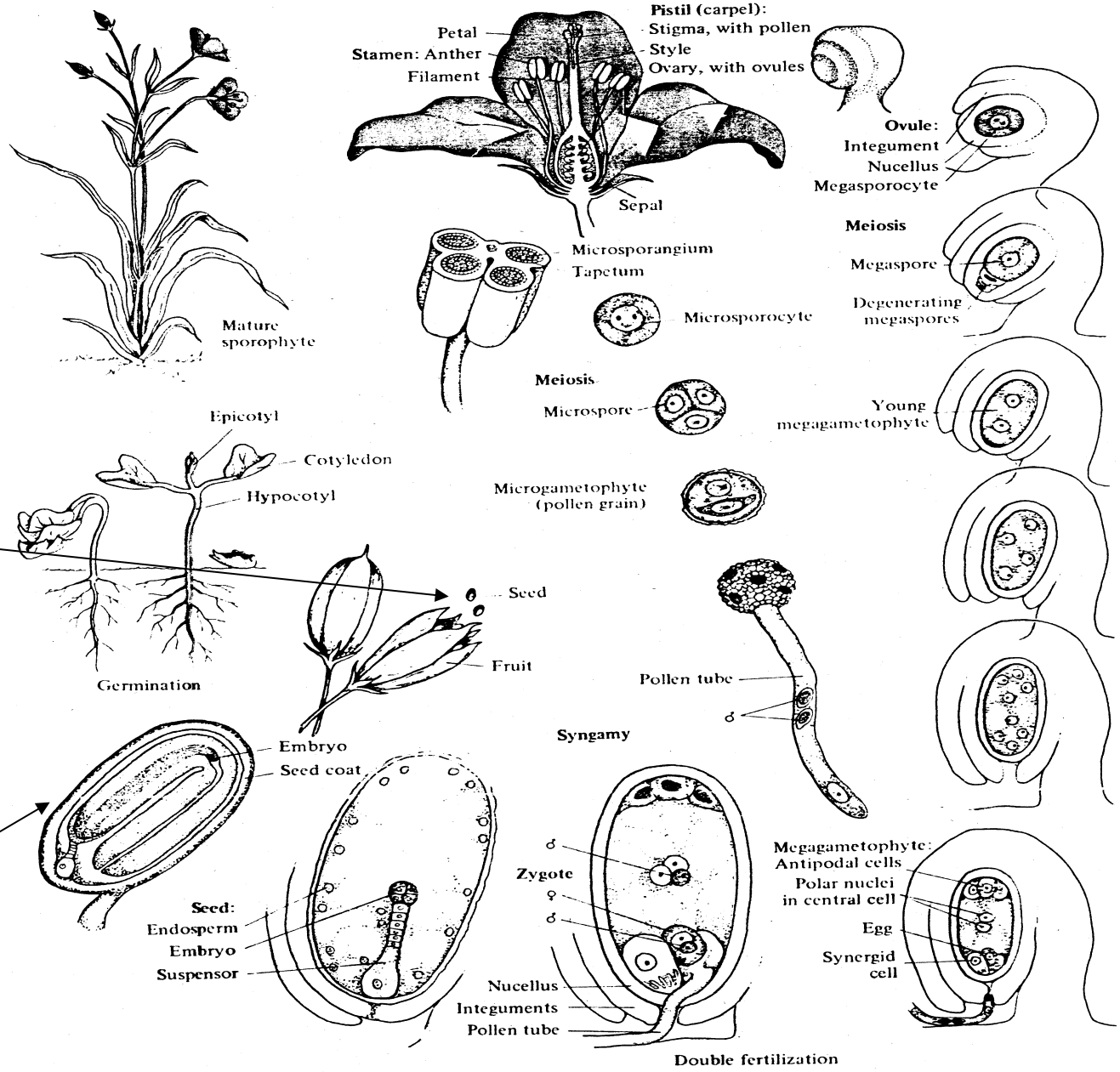
* *Vicia faba.*

† *Phaseolus vulgaris.*

Effect of some seed borne fungi on cowpea seed germination and development

Fungi	%Germination	Average seedling length (cm)	Abnormal seedling
Colletotrichum sp.	58	9.6	Damage to plumule
Aspergillus flavus	64	10.3	Damage to radicle
Phoma exigua	50	12.2	Damage to radicle and plumule
Healthy seed	98	14.5	

Seed Testing Lab.



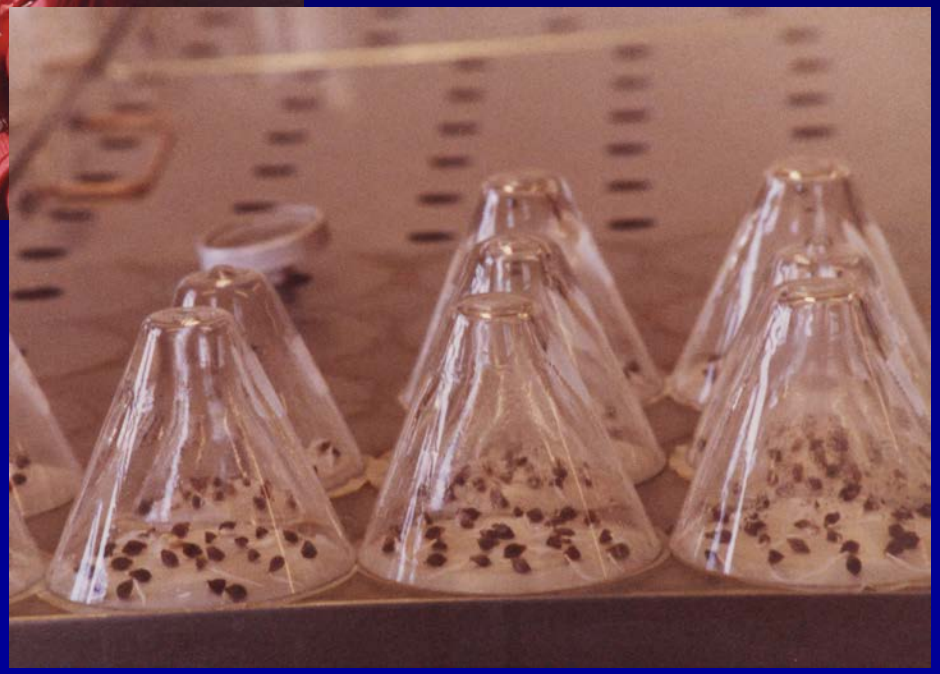
Purity

Germination&

Seed health

Sampling

Purity test



Germination test

Germination test

Germination test

Seed-borne diseases & Seed health testing

Transmission of seed-borne pathogens

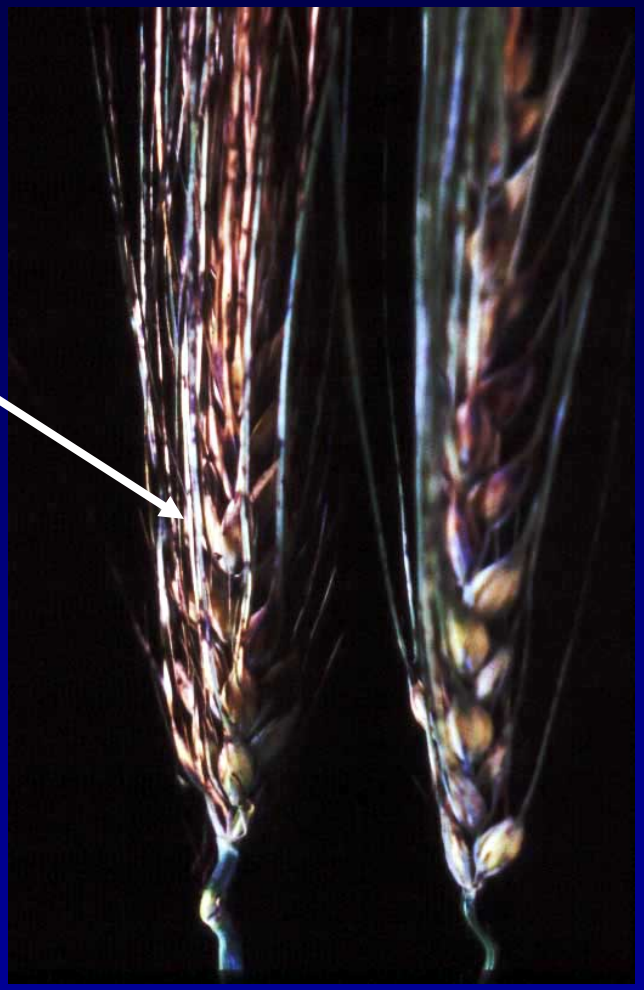
Mother plant → Seed


Infected pod
seed

Infected pod → seed

Ascochyta pinoides

Spot blotch



Infected leaves to seed

Transmission of seed-borne pathogens

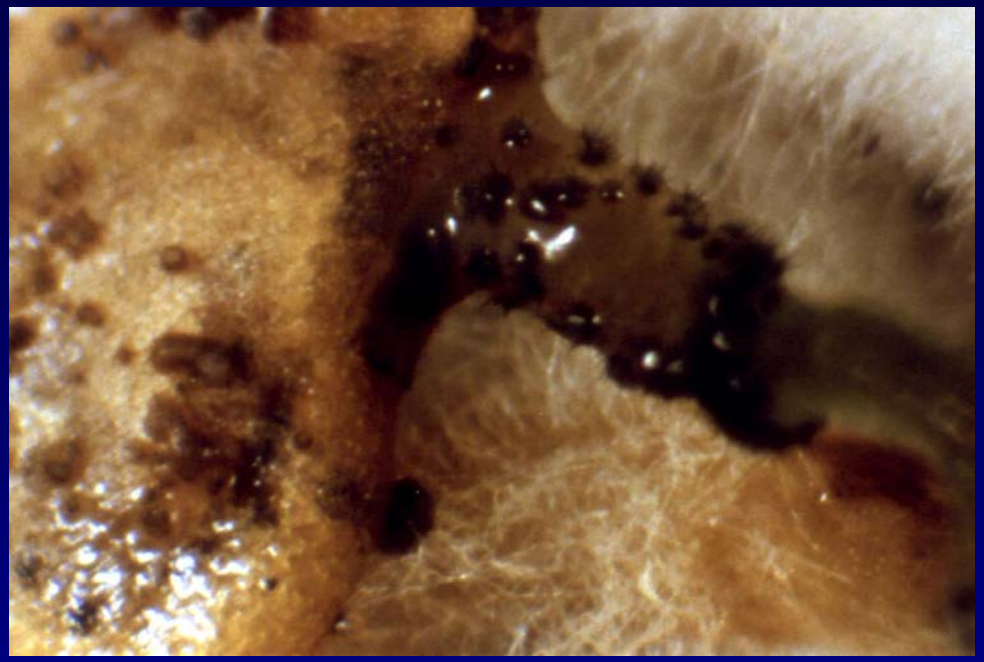
Diseased seeds → other seeds

Smut spores spreaded during harvest

Threshing raddish seed

Transmission of seed-borne pathogens

Infected seed → seedling/mature plant

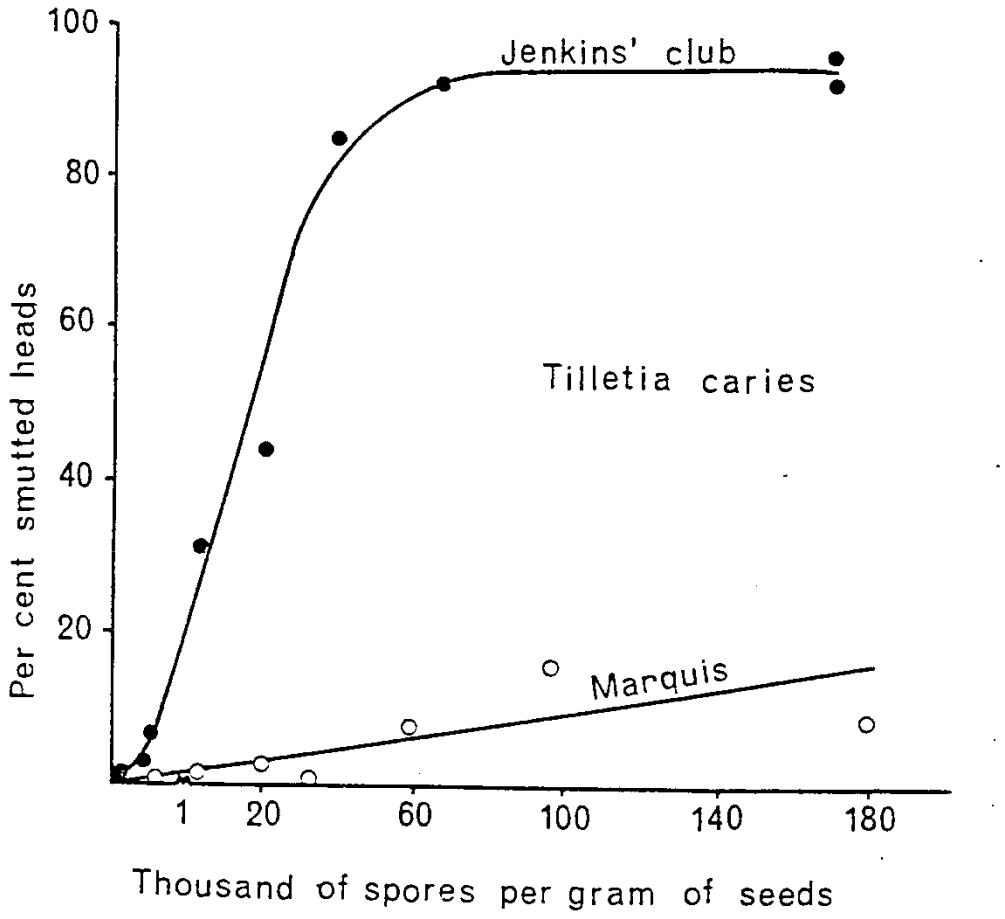


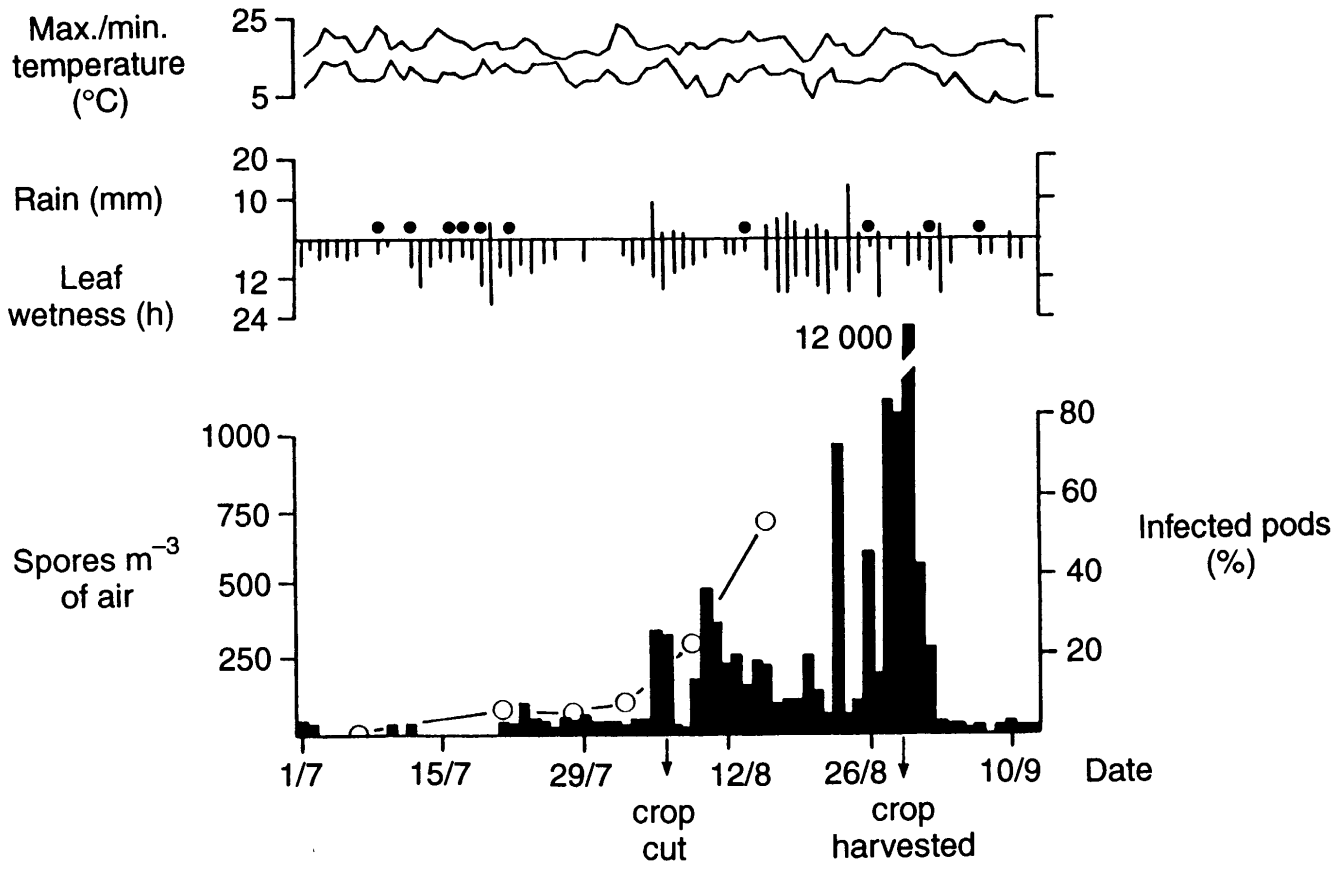
Seedling infection of *C. capsici*

Infection of *U. nuda* at flowering stage of barley

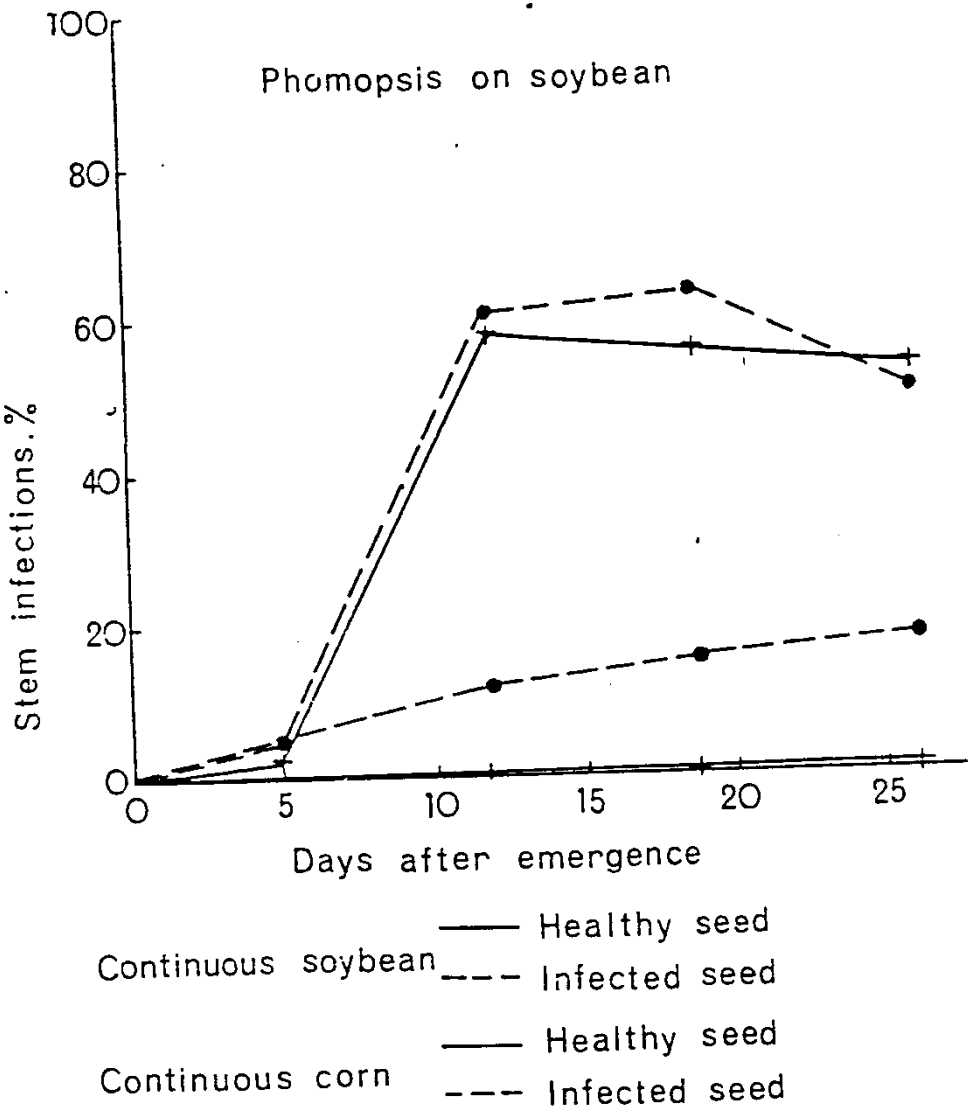
Incidence and spreading in the field of seed borne diseases depended on:

- Resistance
- Environment
- Cultural practices
- Stage of plant
- Viability of pathogen in seed
- Pollen sterility
- Soil microorganisms


100
80
60
40
20
Per cent smutted heads
Jenkins' club
Tilletia caries
Marquis
1
20
60
100
140
180
Thousand of spores per gram of seeds



Effects of climatic factors and harvesting practices on the mean daily concentration of *Alternaria brassicicola* conidia in the air of a cabbage seed production crop. ●, > 0.2 mm to < 1 mm of rain; ○—○, infected pods.


Phomopsis on soybean
Stem infections.%
100
80
60
40
20
0
0
5
10
15
20
25
Days after emergence
Continuous soybean
Healthy seed
Infected seed
Continuous corn
Healthy seed
Infected seed