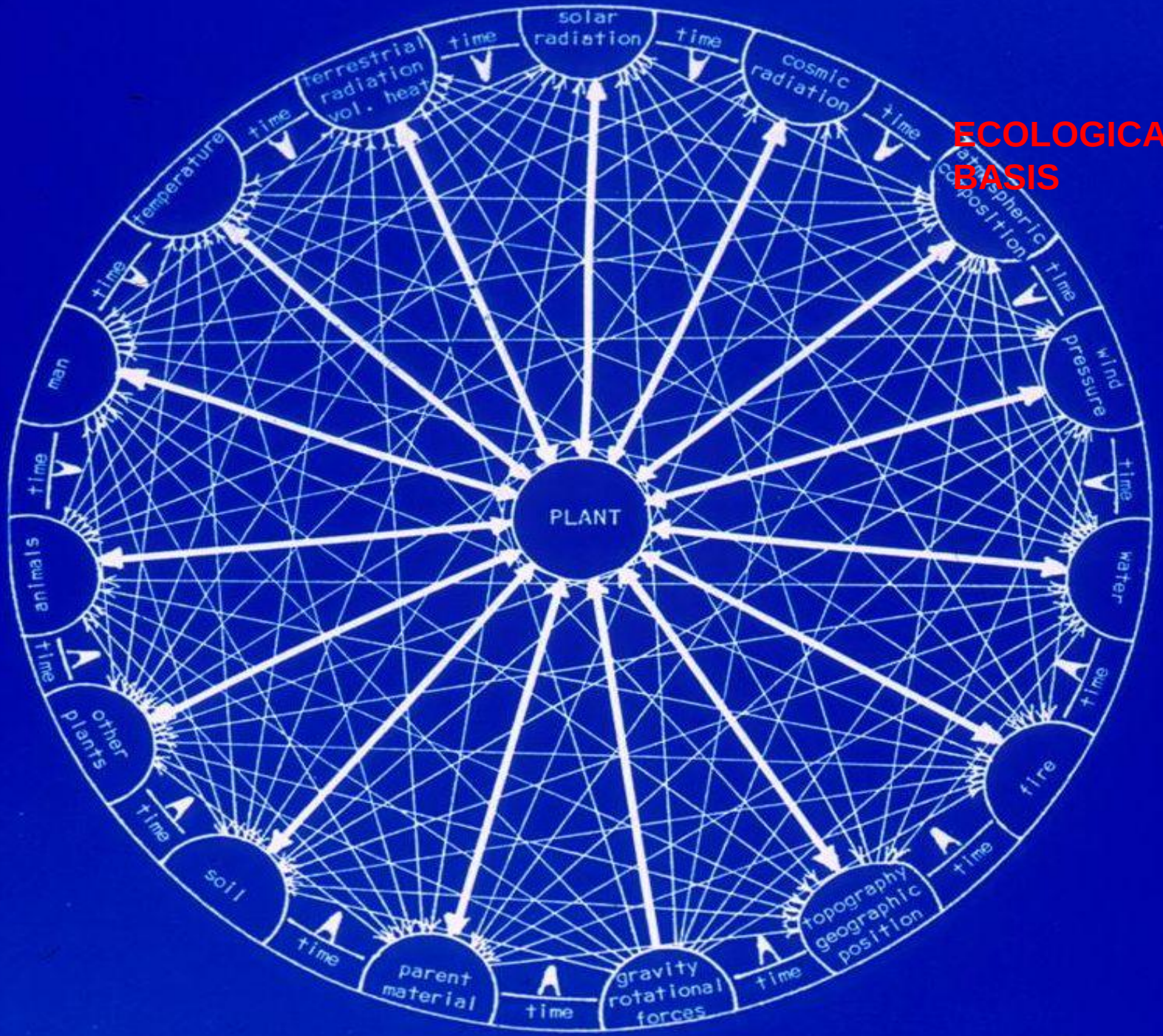
PENGELOLAAN TERPADU PENYAKIT TANAMAN HUTAN

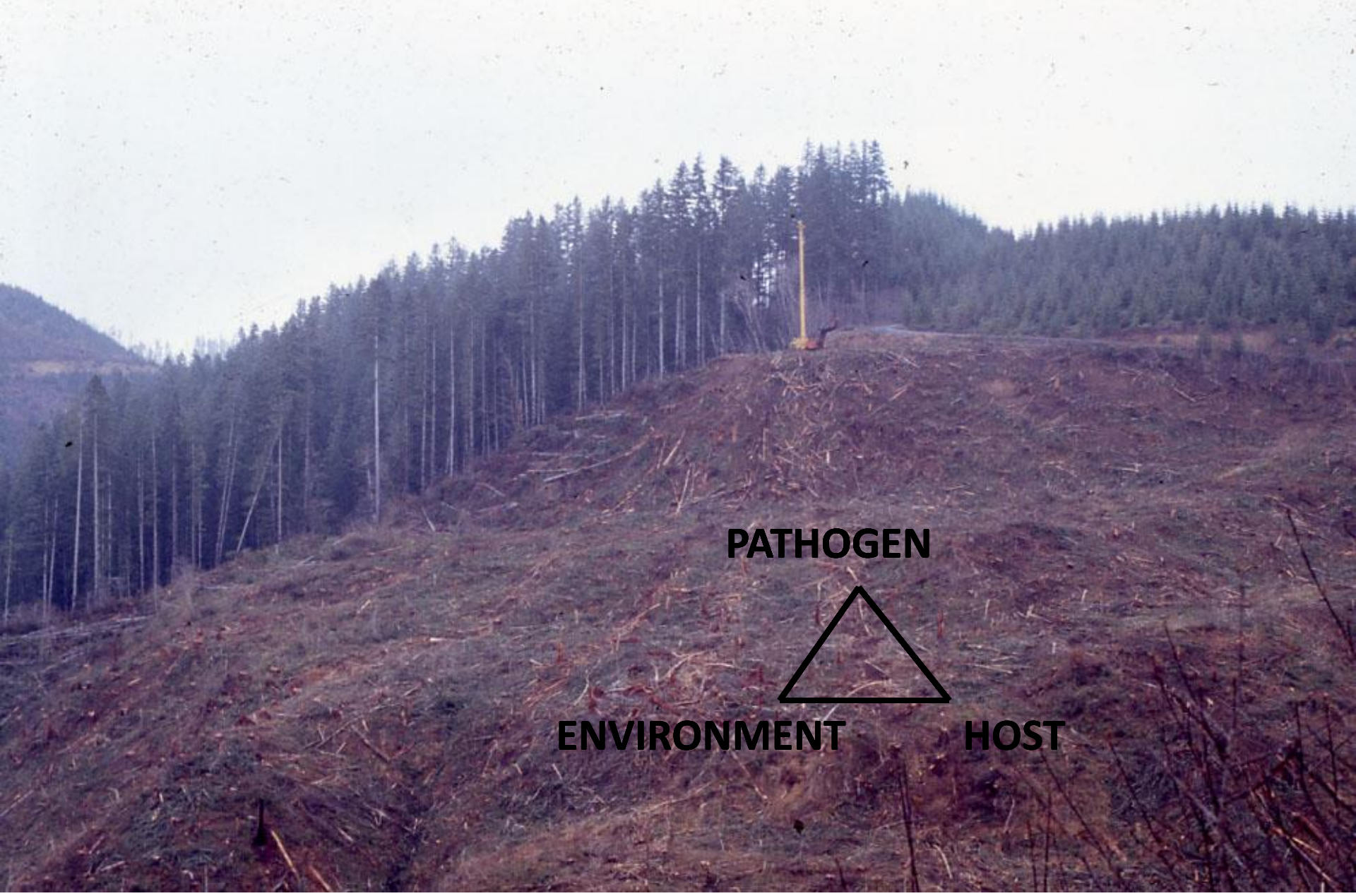
- The comprehensive and coordinated use of **cultural, biological**, and **chemical** tactics to reduce a pest population below an acceptable threshold
- **Cultural** – non-chemical tactics, host plant resistance, planting date, cover crops, traps, scouting, crop rotation, sanitation, etc.
- **Biological** – natural enemy conservation & enhancement
- **Chemical** – pesticide selection and spray timing

Integrated Forest Protection

- Interdisciplinary (Systems approach)
  - Clear goals
- Ecological basis
  - Pest interactions
  - Plant Disease Triangle
- Economic (or action) thresholds
- Use a variety of tactics and treatments in a coordinated approach
  - Prevention of pest problems

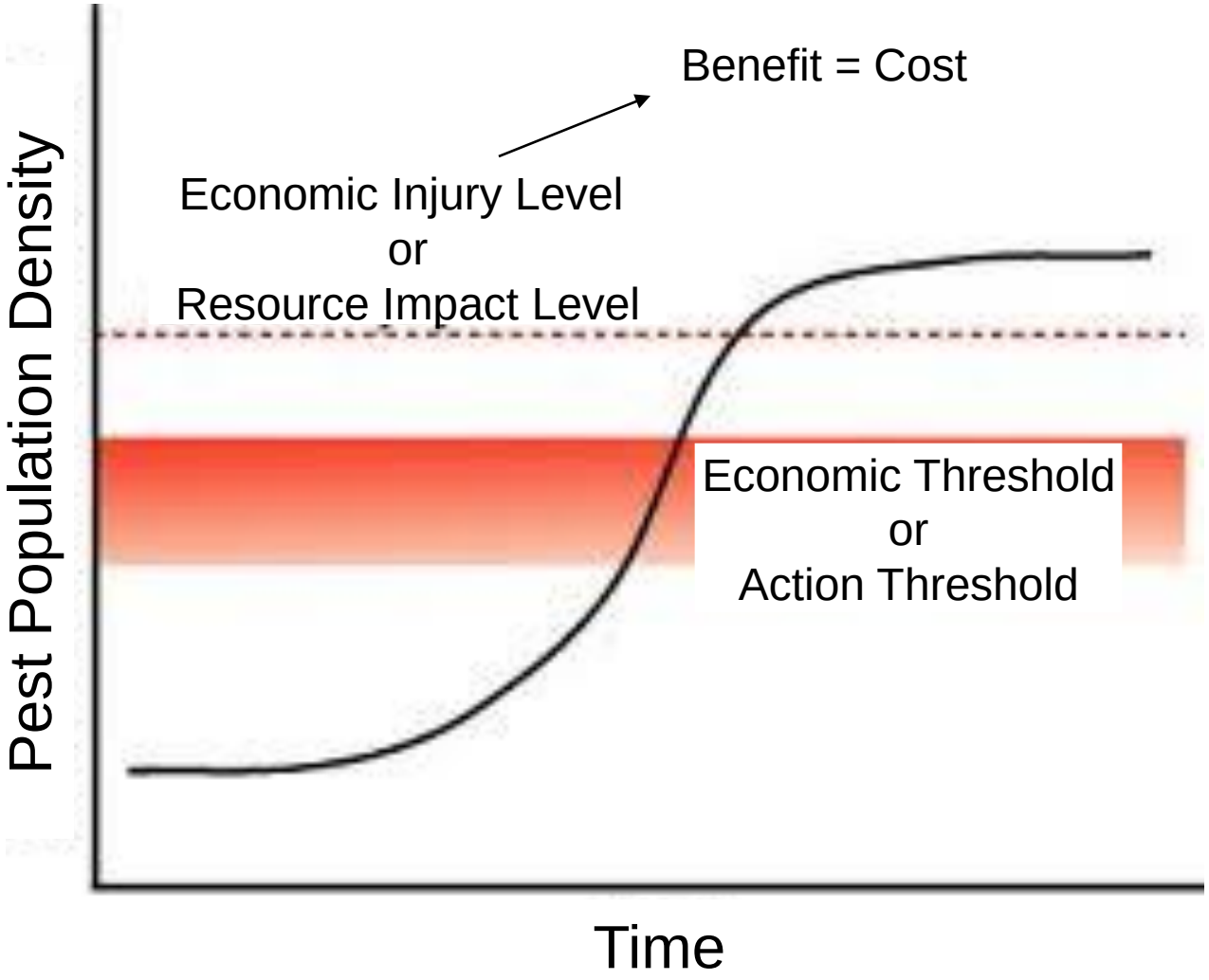
Systems Approach


ECOLOGICAL BASIS
PLANT
solar radiation
cosmic radiation
terrestrial radiation vol. heat
temperature
atmospheric composition
wind pressure
water
fire
topography geographic position
gravity rotational forces
parent material
soil
other plants
animals
man
time



PLANT DISEASE TRIANGLE

Economic (or Action) Thesholds



Information Needed to Implement Integrated Forest Disease management

- Basic biology and ecology
- Impact data
- Detection/monitoring systems
- Hazard/risk rating systems
- Treatment alternatives

PRINCIPLES FOR PREVENTING DAMAGE AND DISEASE IN PLANTATION FORESTS

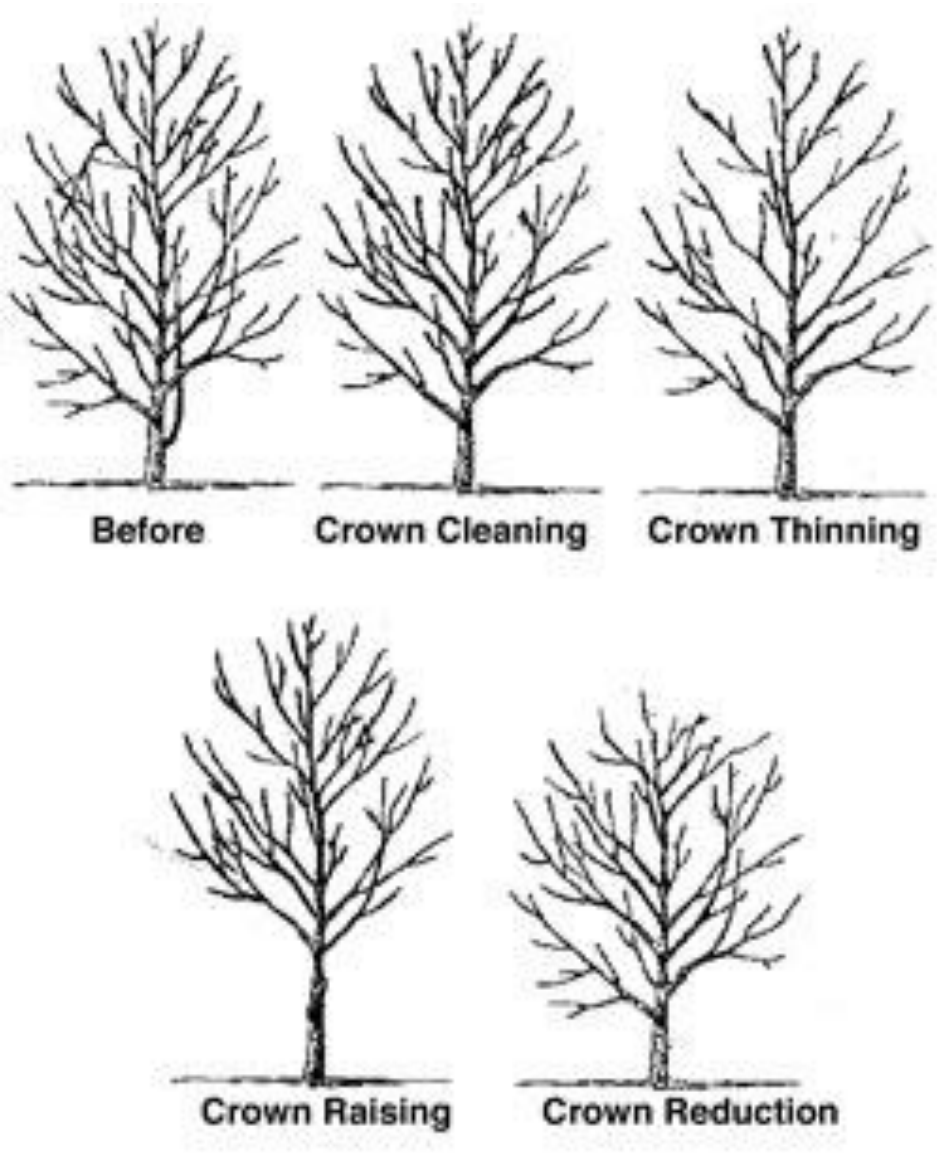
Following healthy forestry practices will help:

- reduce unnecessary stress on trees
- encourage resistance to pests and diseases,
- minimize the impacts of disease and damage in the plantation.

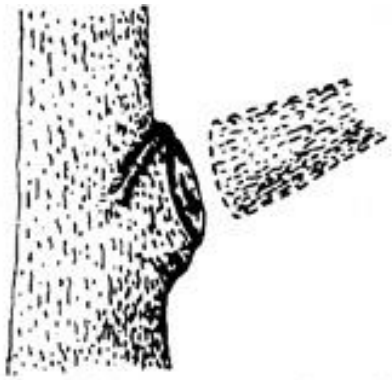
Reduce unnecessary stress on trees

- **Thin or Prune and fertilize trees**
- **Manage weeds** adequately to reduce stress placed on trees, helping them tolerate insect attacks and fungal diseases.

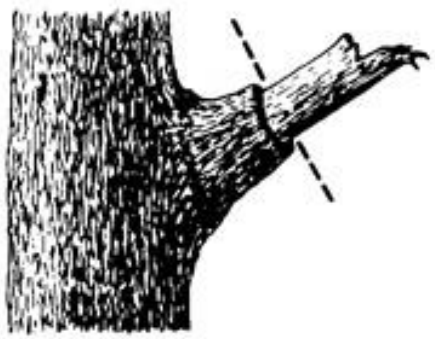
Thinning is the selective removal of branches to increase light penetration and air movement through the crown. Thinning opens the foliage of a tree, reduces weight on heavy limbs, and helps retain the tree's natural shape.



Pruning is the most common tree maintenance procedure. Although forest trees grow quite well with only nature's pruning, landscape trees require a higher level of care to maintain their safety and aesthetics. Pruning should be done with an understanding of how the tree responds to each cut. Improper pruning can cause damage that will last for the life of the tree, or worse, shorten the tree's life.

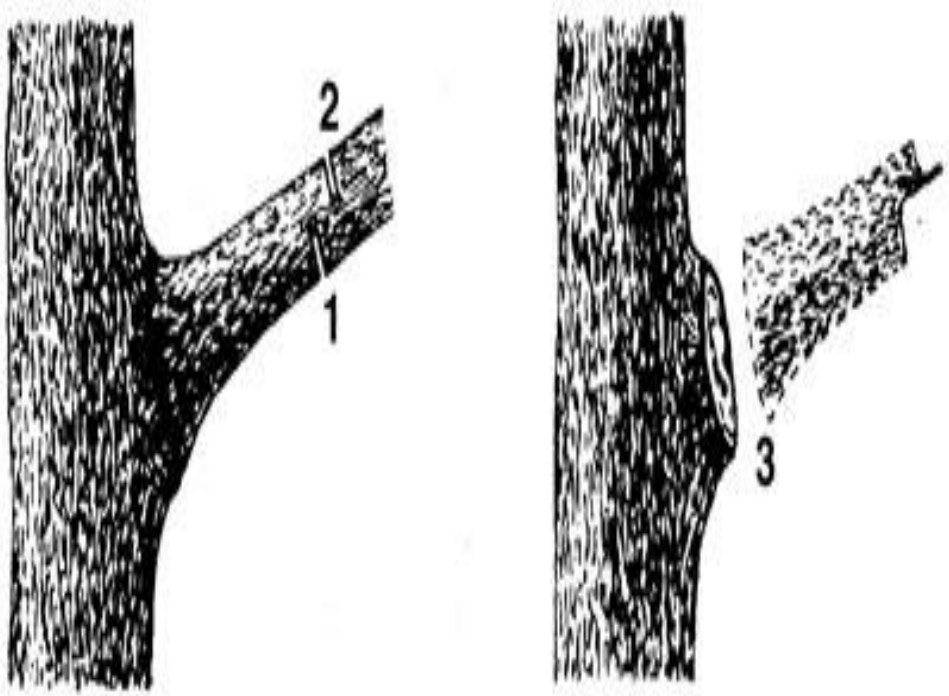


Pruning cuts should be made just outside the branch collar.



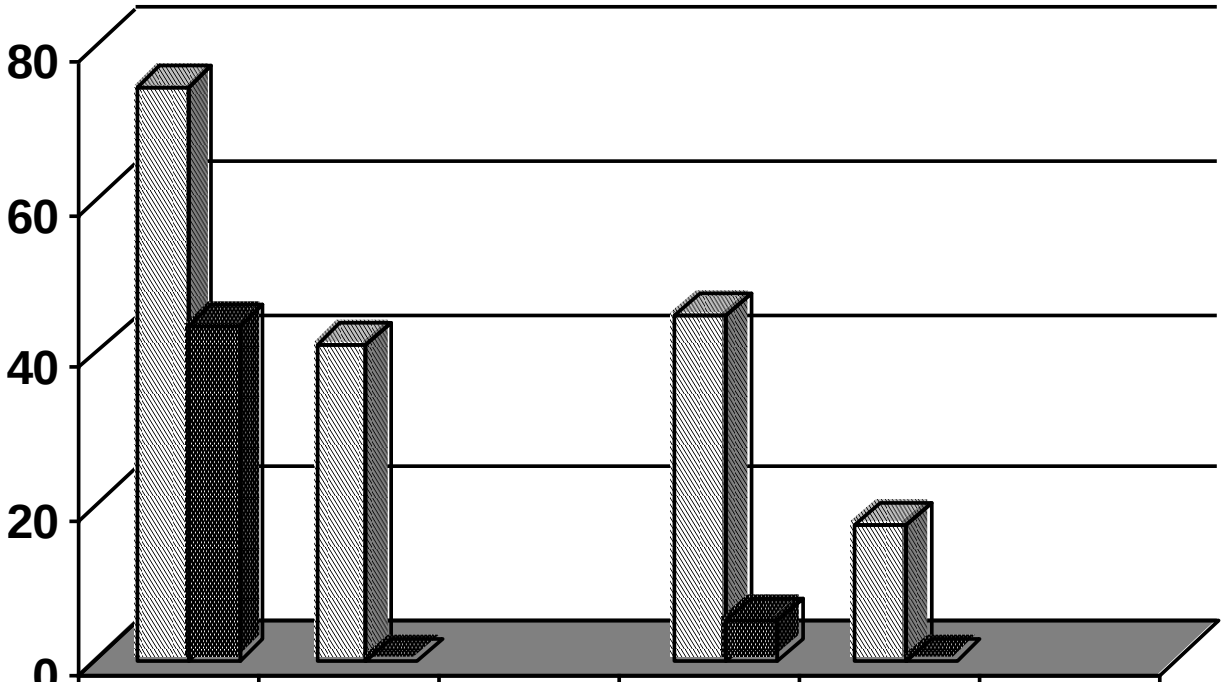
On a dead branch that has a collar of live wood, the final cut should be made just beyond the outer edge of the collar

Most routine pruning to remove weak, diseased, or dead limbs can be accomplished at any time during the year with little effect on the tree. As a rule, growth is maximized and wound closure is fastest if pruning takes place



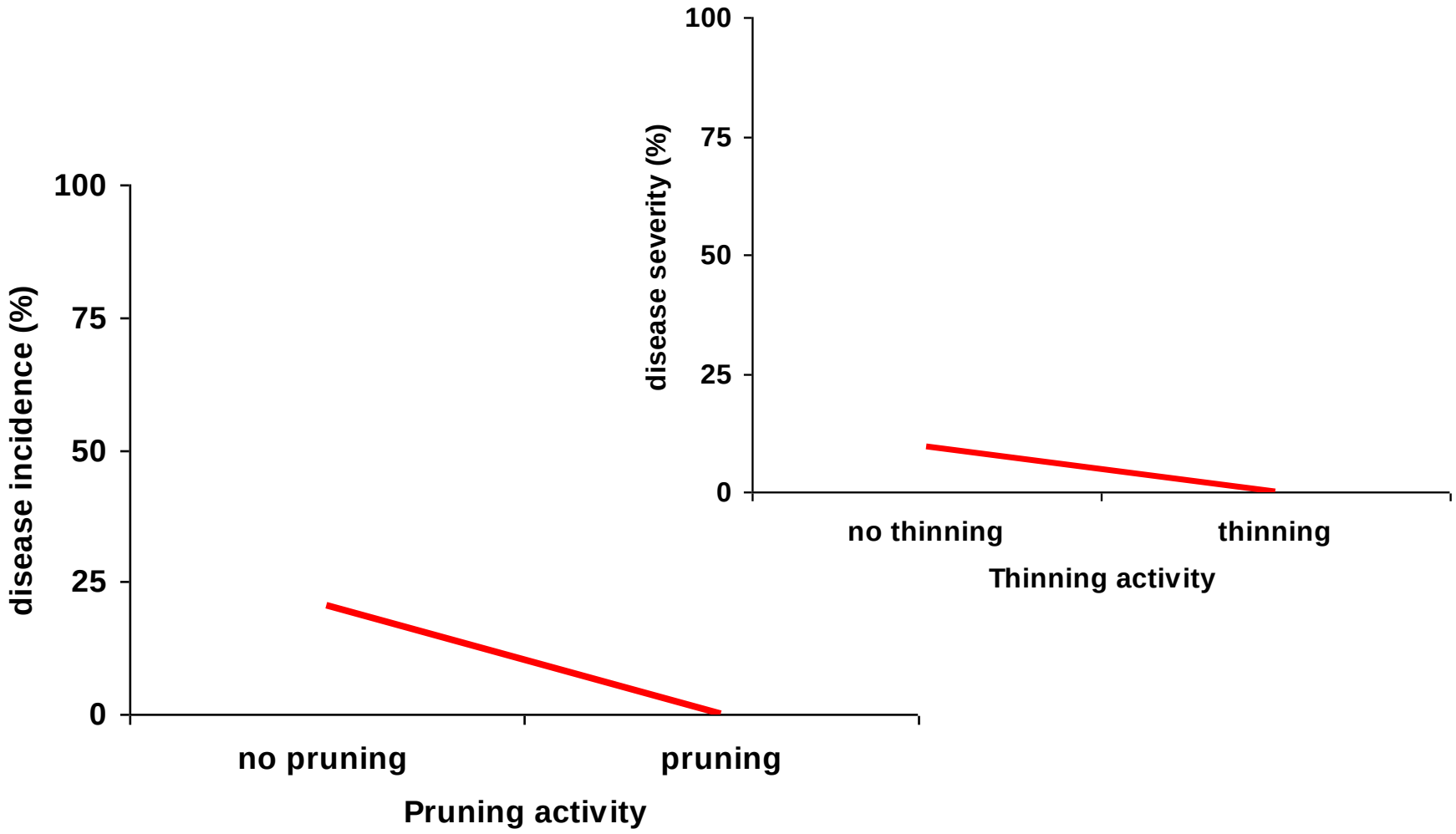
Use the three-cut method to remove a large limb.

A few tree diseases can be spread when pruning wounds allow spores access into the tree. Susceptible trees should not be pruned during active transmission periods.



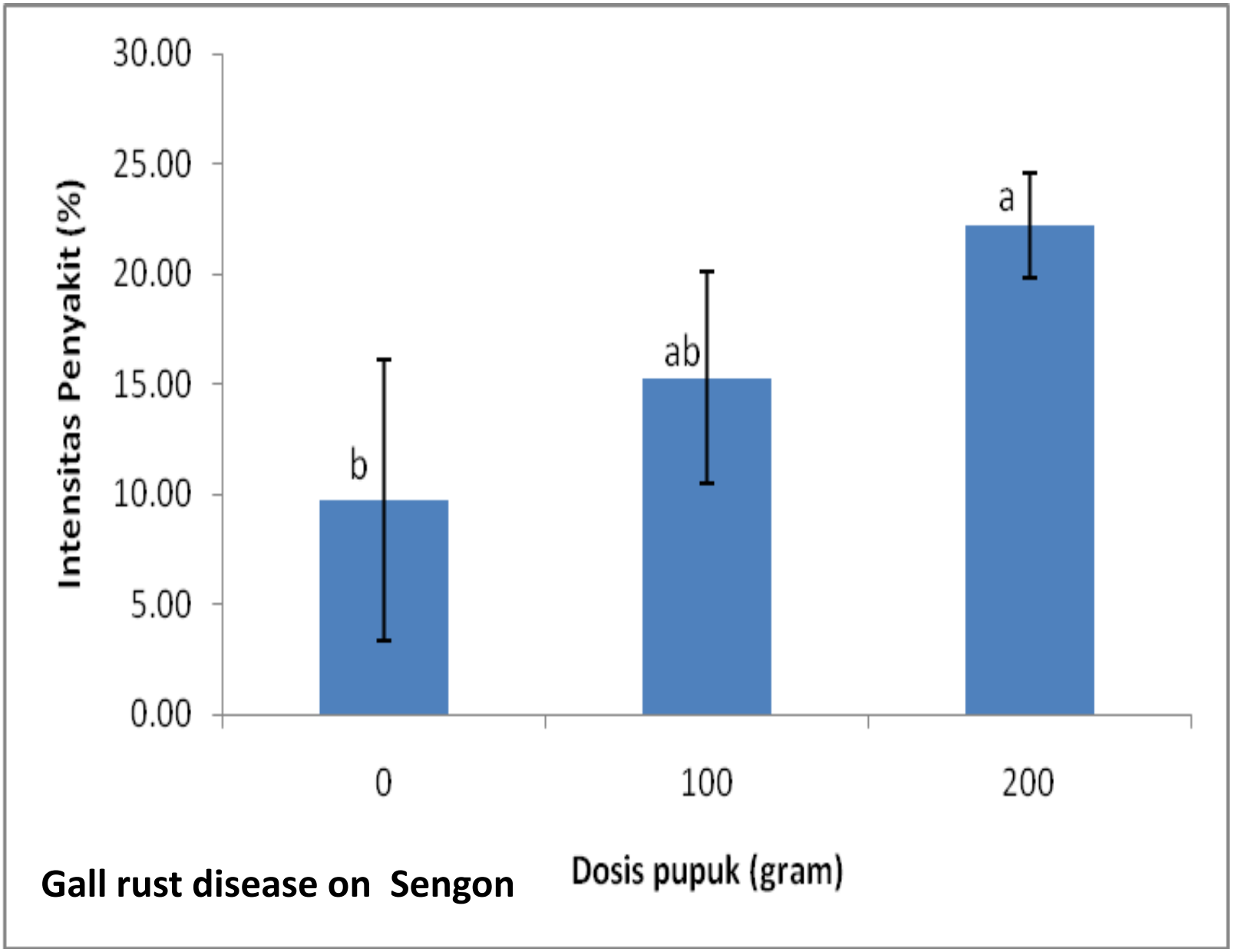
Pagergunung	74.3	41		45	17.3	
Karangwuni	43.5	0		5	0	

Pruning dan Thinning



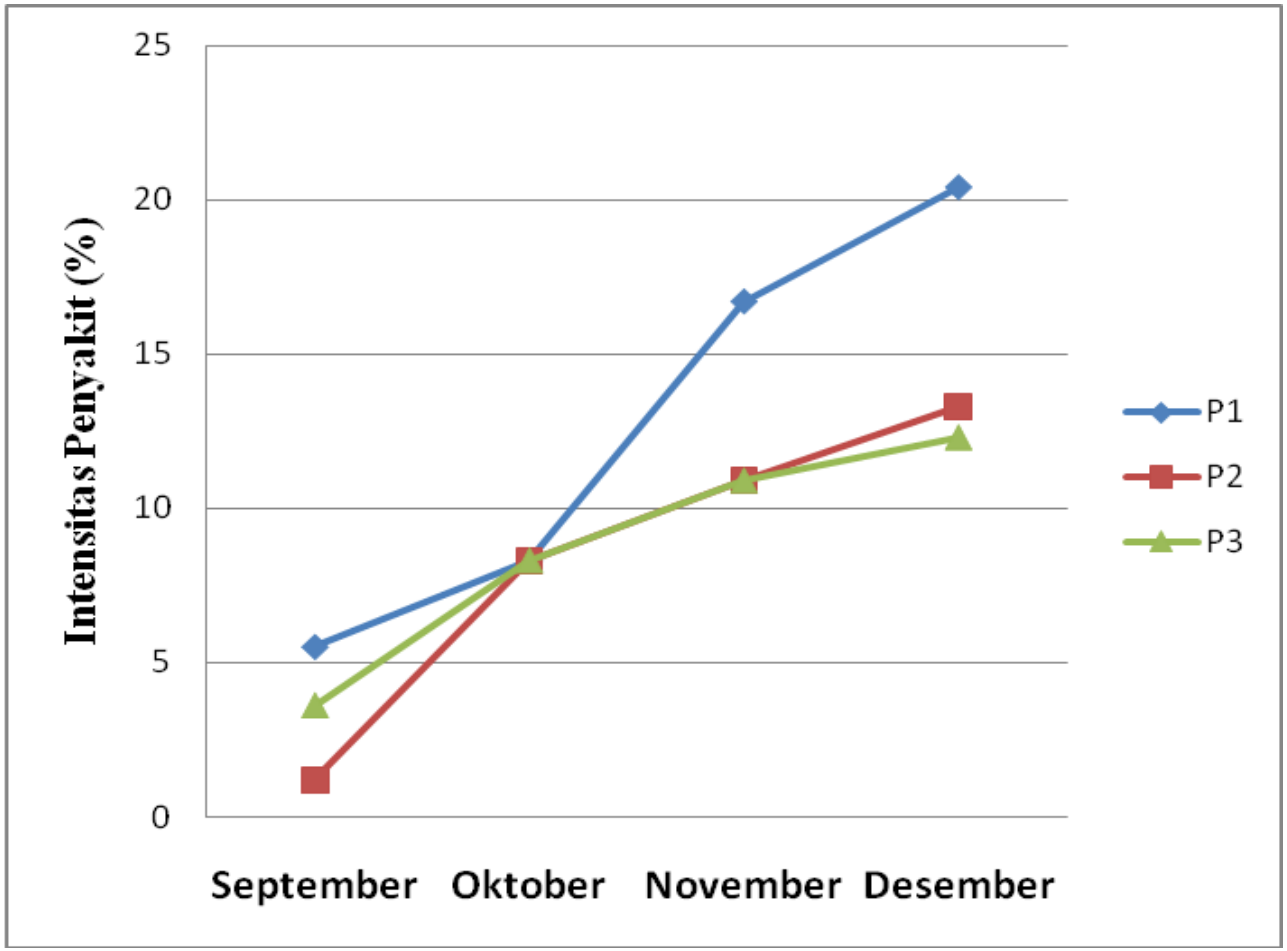
Fertilizer: Any material used to supply one or more of the essential plant nutrient.

Addition of the correct amount of fertilizer can promote healthy flower production and foliage growth while an excessive fertilizer application can decrease plant health and can lead to decline and death.



Gall rust disease on Sengon

Pemupukan yang seimbang



Perkembangan Intensitas penyakit karat tumor pada pertanaman sengon umur 2 tahun yang di pupuk menggunakan NPK dosis 0 g (P1), 100 g (P2) dan 200 g (P3) per pohon, dari bulan september sampai Desember 2010

Regularly inspect your trees to alert you to new damage or possible disease outbreaks.

- Individual trees can be effected by construction within the root zone.
- Trenching, paving and soil compaction can damage the root system immediately, or cause damage that may not show symptoms for many years.
- An assessment of previous impacts along with results of the inspection combine to offer a comprehensive picture of current and potential problems.

Monitoring penyakit karat tumor

Di persemaian

Di lapangan

Ketinggian tempat	Kurang dari 1 tahun	Antara 1 sampai 3 tahun	Di atas 3 tahun
< 150 m dpl	-	-	-
150-300 m dpl	1 x/ bulan	1 x/ 2 bulan	1 x/ 3-4 bulan
> 300 - 450 m dpl	2 x/bulan	1 x/ bulan	1 x/2 bulan
> 500 m dpl	4 x/ bulan	2 x/ bulan	1 x/ bulan

The presence of fungal fruiting bodies, mushrooms, can indicate decay. Certain decay fungi may destroy support tissues and leave conductive tissues unharmed.

Reduce the introduction and spread of disease by regularly inspecting and washing equipment and vehicles and restricting vehicle movements between infected and non-infected areas of your plantation.

Cultural practices

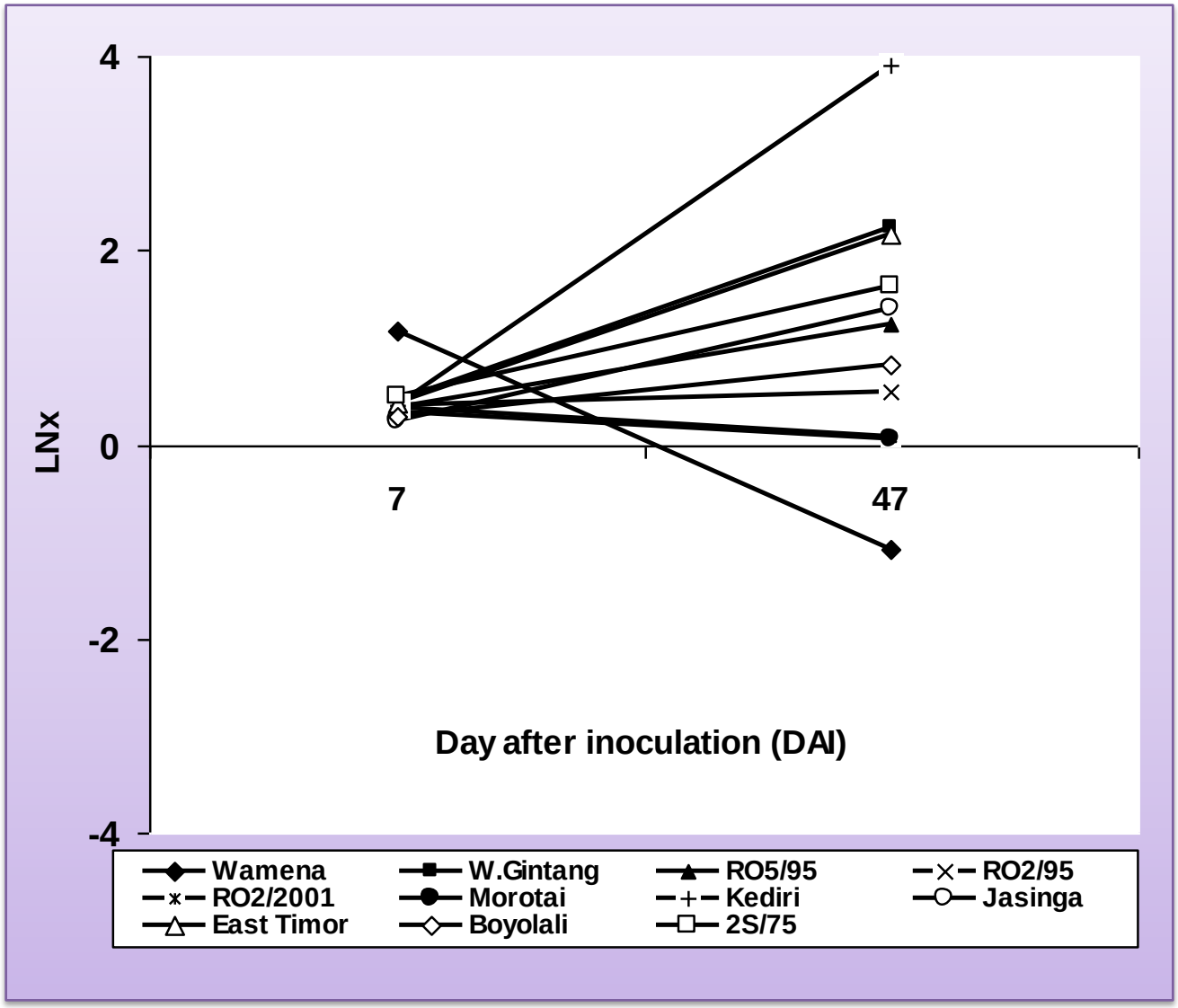
Plants or animals selected for specific traits (e.g. GMO cotton, Brahman-infused breeds in tick areas)

Watering, fertilising, pruning or mulching to maintain plant health and vigour

Pest and residue removal

Crop management practices (e.g. crop rotations to reduce pest pressure, burning or deep ploughing stubble just before planting)

Penggunaan benih dari genetic base yang luas



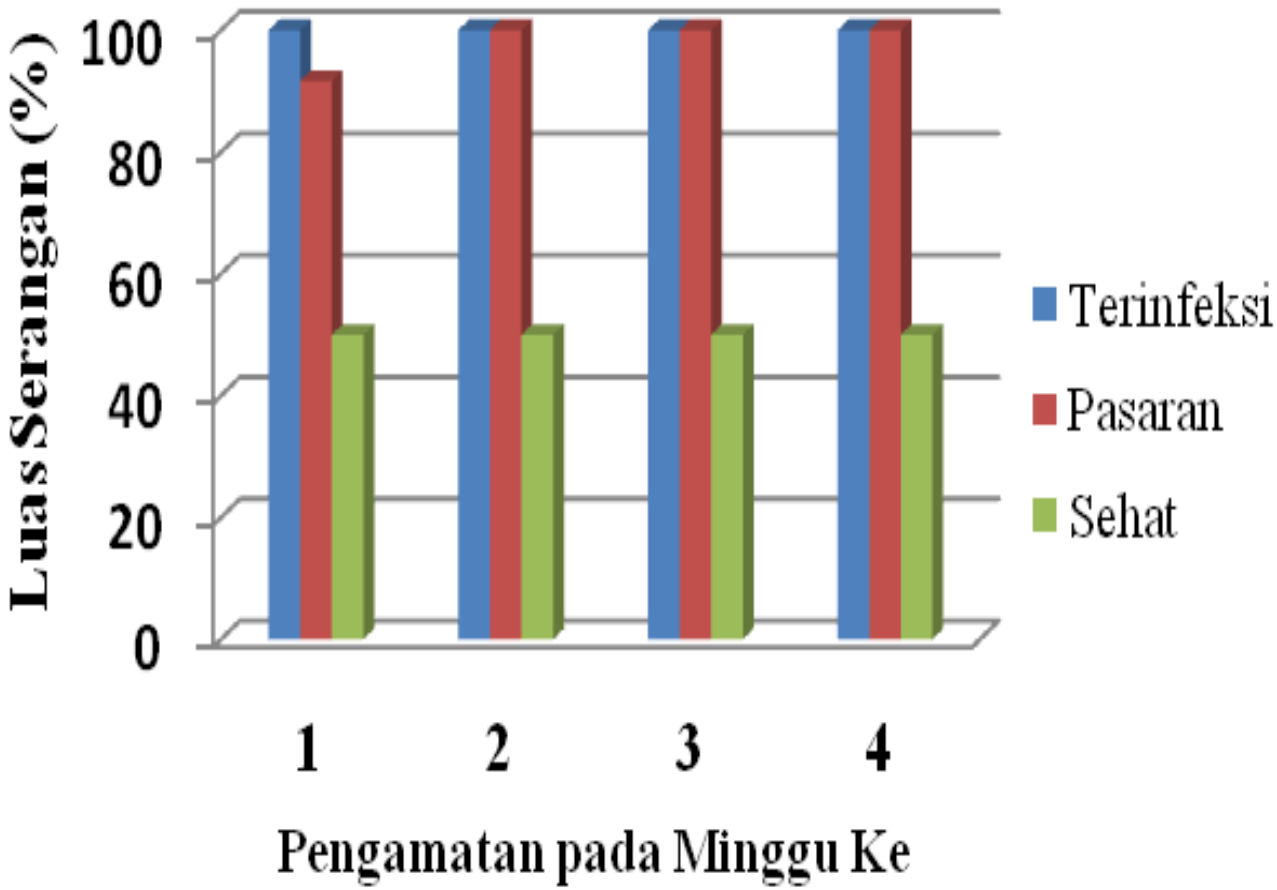
Tabel 6.4. Rerata jumlah biji sengon yang viabel berdasarkan uji tetrazolium dan uji belah

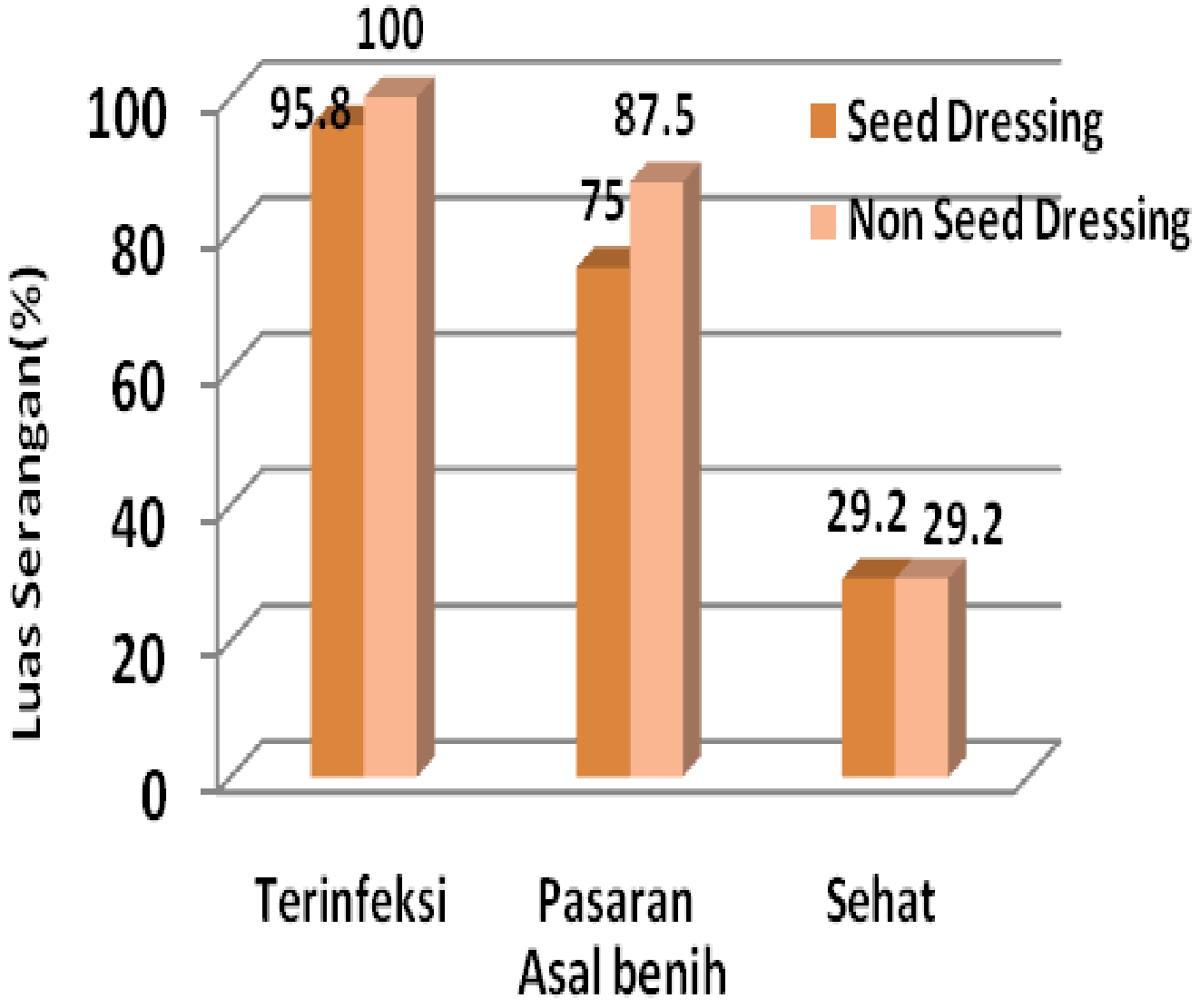
No	Kriteria Benih	Rerata biji Viabel berdasarkan uji	
		Tetrazolium	Belah
1	Biji dari tegakan dan polong sehat (S)	94 a	97 a
2	Biji dengan polong tanpa tumor (PTT)	73,9 b	70 b
3	Biji dengan polong tumor kecil (PTK)	70,7 b	70 b
4	Biji dengan polong tumor besar (PTB)	73,6 b	63 b


cm 1 2
0.5 mm


cm 1
0.5 mm


cm 1 2
0.5 mm


Luas Serangan (%)
100
80
60
40
20
0
1
2
3
4
Pengamatan pada Minggu Ke
Terinfeksi
Pasaran
Sehat


100
95.8
87.5
75
29.2
29.2
Seed Dressing
Non Seed Dressing
Luas Serangan(%)
100
80
60
40
20
0
Terinfeksi
Pasaran
Sehat
Asal benih

Seleksi semai yang sehat dan pertumbuhannya baik

Biological controls

Beneficial insects

Natural enemies (e.g. pest parasites or predators)

Fly and insect trapping

Pheromones

Bacterial and fungal biocontrol species in commercially-available disease-control products

- ***Gliocladium virens***
- ***Trichoderma harzianum*** **and other species**
- ***Bacillus subtilis, B. pumilus,*** **etc.**
- ***Pseudomonas syringie***
- ***Coniothyrium minitans***
- ***Streptomyces*** **sp.**

Mycorrhizal Inoculants

Arbuscular mycorrhizae aka

endomycorrhizal fungi

Natural symbiotic fungi - healthy roots

Root system larger and more active

Plants tolerate root pathogens

Reduced growth of pathogens

Increased host resistance?

Competition for resources?

Chemical controls

Fungicide: appropriate product at the best time and after careful monitoring of pest levels

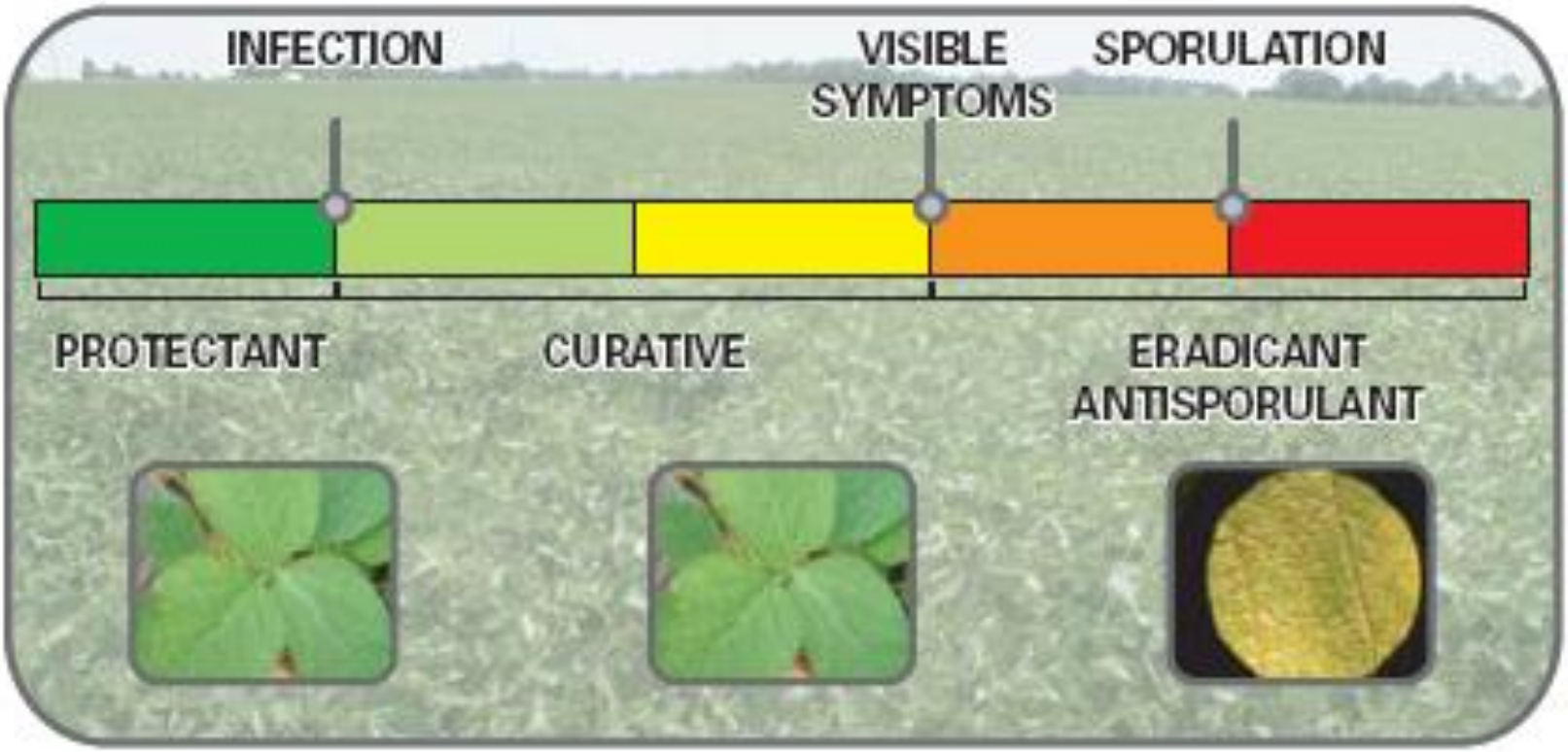
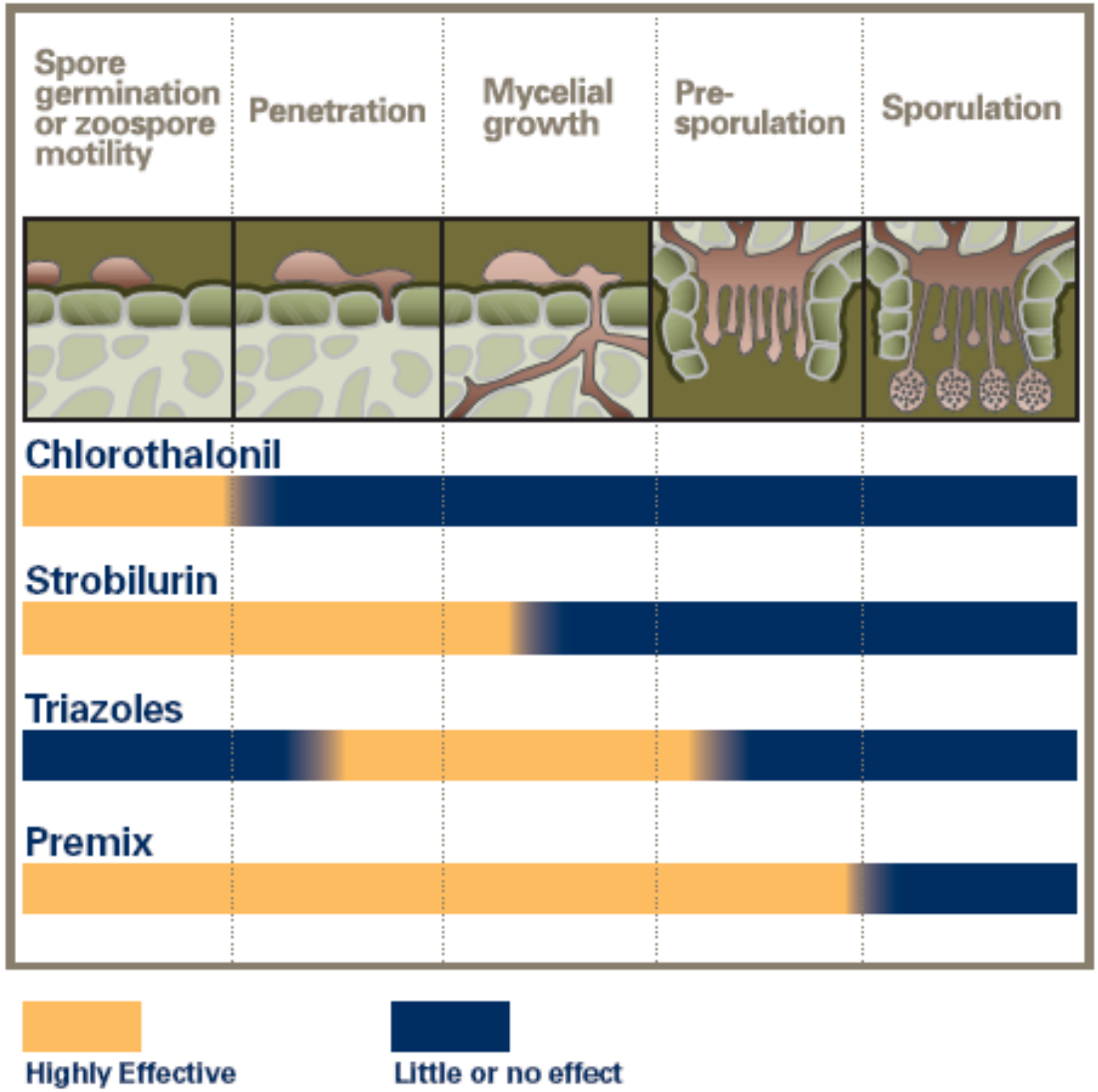


Figure 7.1. Schematic representation of fungicide activity in relation to soybean rust development.


Spore germination or zoospore motility
Penetration
Mycelial growth
Pre-sporulation
Sporulation
Chlorothalonil
Strobilurin
Triazoles
Premix
Highly Effective
Little or no effect

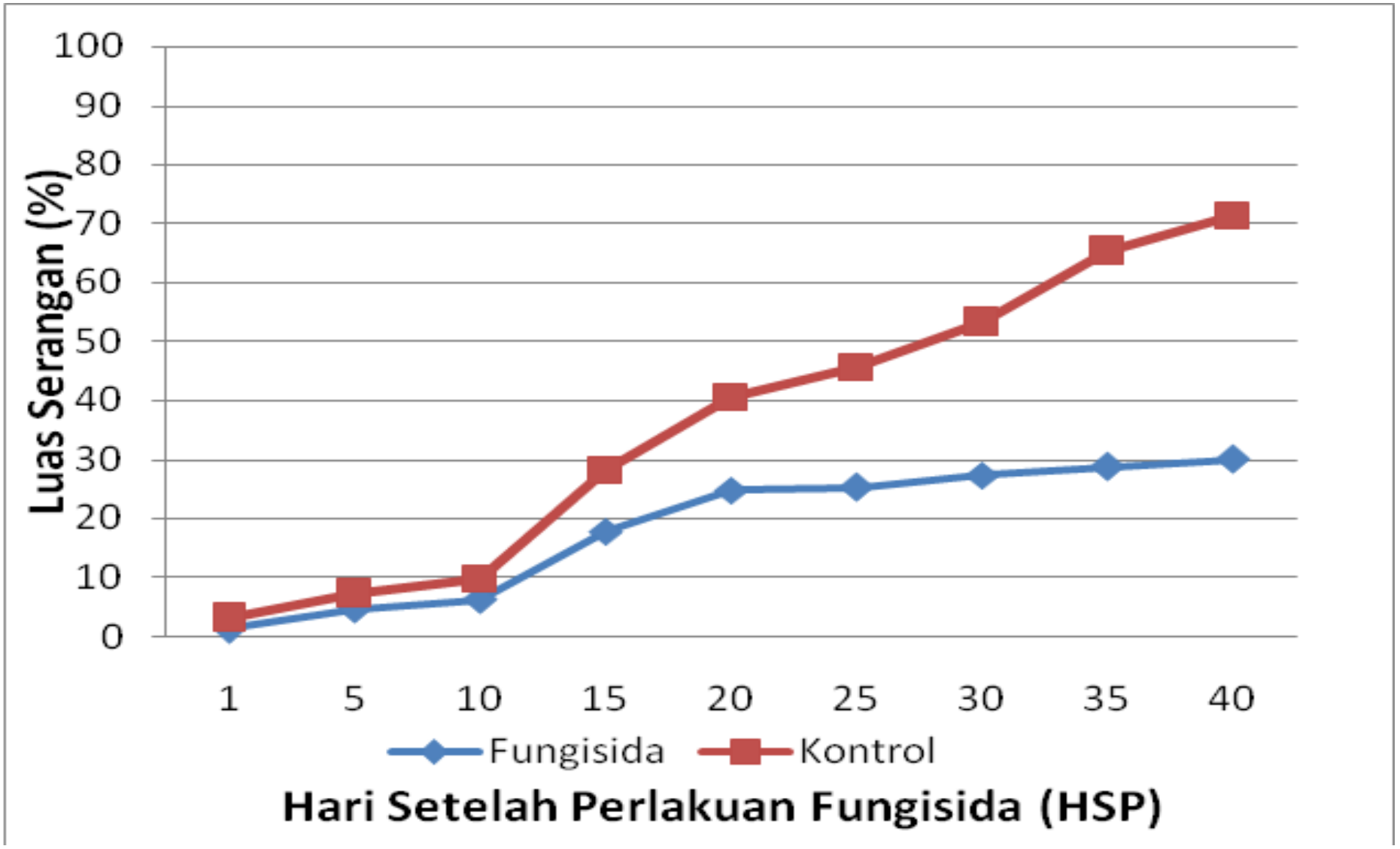
Uptake and Movement in Plants ?

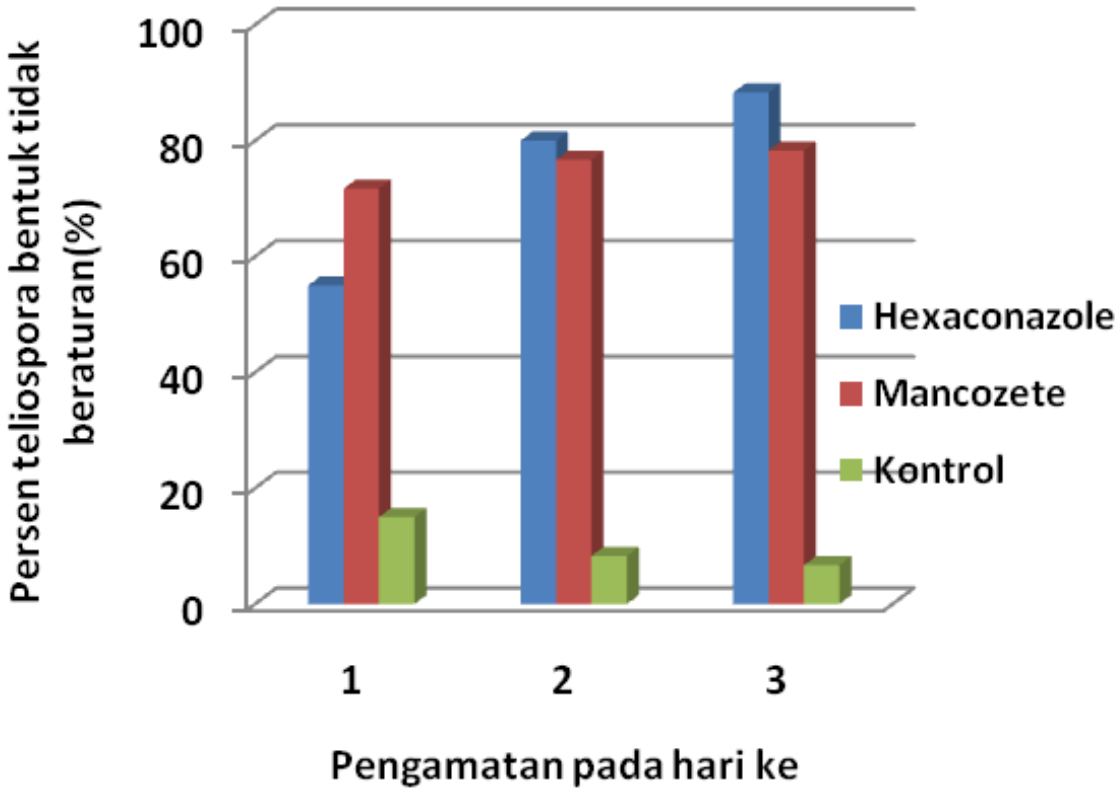
Fungicide Mode of Action ?

Fungicide Resistance Concerns

A major concern associated with strobilurin fungicides, and to lesser extent the triazoles, is the potential for resistance to develop among populations of *Phakopsora pachyrhizi*exposed to these fungicides.

Aplikasi Fungisida





Persen teliospora jamur karat pada permukaan jaringan pucuk semai sengon yang diperlakukan dengan fungisida berbahan aktif Hexaconazol, Mancozete dan kontrol (tidak diperlakukan dengan fungisida)

Sumber data : Wahyu, P.K. (2012)

TERIMAKASIH