The Sins of Overgrazing

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WASHINGTON STATE UNIVERSITY EXTENSION

Do Your Pastures Look Like This??

Question 1

Is it possible to overgraze, undergraze and properly graze in the same pasture at the same time?

- A. No
- B. Maybe
- C. Yes
- D. Beats me!

Question 2

Does overgrazing mean I just need to feed more hay?

- A. Yes, help Steve's 'grandpa' account
- B. Maybe, depends on hay $$$
- C. No, may also need to replace lost nutrients and plants
- D. Absolutely Not, let's add more animals to eat those weeds off and get pastures growing again!

Question 3

Overgrazed pastures struggle from?

- A. Hot, dry summers
- B. Cold, wet winters
- C. Cold spring soils with slow nutrient release
- D. Cooling fall soils where nutrient release is fast and high losses
- E. All of the above

Question 4

What growth stage represents the longest 'general' time for overgrazed pastures?

- A. Lag
- B. Early log
- C. Late log
- D. Senescence
- E. None of the above

Question 5

Will an overgrazed pasture ever return to full production capacity?

- A. Certainly
- B. Yes
- C. No
- D. Impossible

Question 6

The ‘Bladeless’ appearance from overgrazed pastures should (do)?

- A. Not detour continuation of same
- B. Save you money on fertilizer / seed
- C. Gives you daily exercise feeding hay
- D. Easy monitoring of hoof health
- E. All of the above and a dozen more!

Question 7

When overgrazing, maintaining the lag phase will?

- A. Increase apical meristem number
- B. Increase LAI
- C. Increase WSC
- D. All of the above
- E. None of the above

Question 8

Recover from overgrazing could include?

- A. Increased patience, give it time!
- B. Buy some seeds and renovate!
- C. Aerating, fertilization, weed control!
- D. Why not make more paddocks while including A, B, and C?

Question 9

The major ‘benefit (s)’ from overgrazed pastures are?

- A. Easy inspection of soil texture by touching the surface
- B. Fire protection
- C. Less likely to loose golf balls when practicing your game
- D. Always have a ball field ready for weekend fun and games
- E. All of the above are ‘true benefits’!

What problems can we see?

What is the basic unit of a pasture / hay field community?

Tiller: it is composed of leaves, stem, nodes, internodes, apical meristem, intercalary meristem, axillary meristem, and roots.

Yield from a Pasture Community

$$\text{Pasture Yield} = \frac{\text{Number of Tillers}}{\text{Land Area}} \times \frac{\text{Weight}}{\text{Tiller}}$$

LEAF AREA INDEX

- Sunlight reaching soil surface is a loss of good energy forages need for maximum yield
- Critical LAI is the amount of leaf area necessary to capture 95% of incoming sunlight
- Grasses (vertical leaf) and legumes (horizontal leaf) differ in amount of canopy needed to reach critical LAI

Chemical structure of the most important Sugar in Cool-Season Grass Stubble and Roots

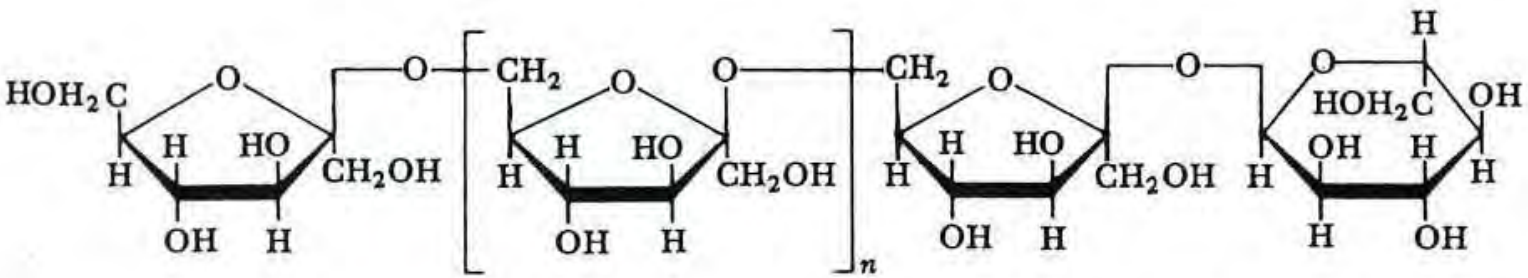


Fig. 1. The β-(2-6)-linked D-fructofuranose repeating unit of levan.

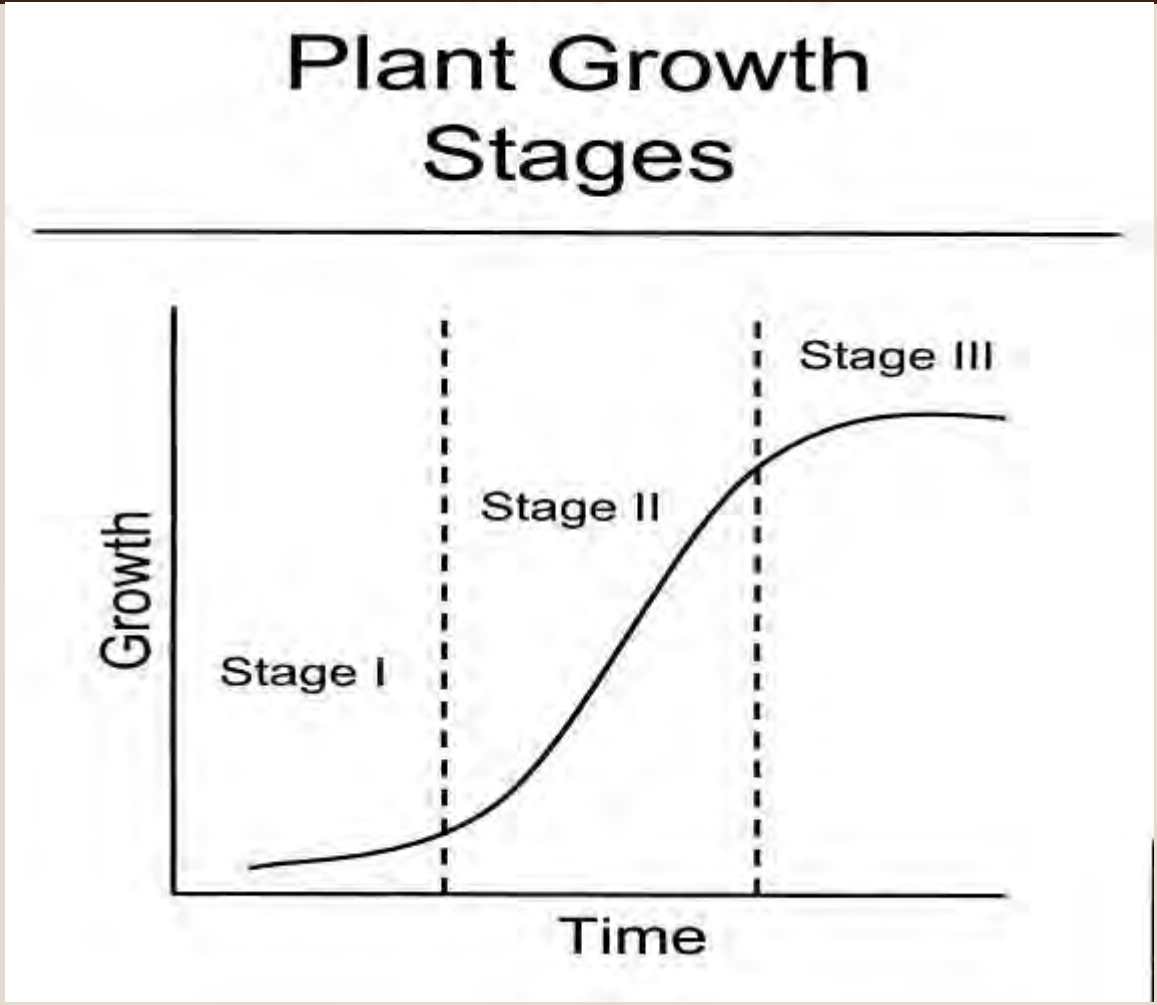
What is Overgrazing?

- **Easy to recognize but difficult to define; like religion you know it's there but can't touch it!**
- **We know more about causes of overgrazing than how to correct the problem.**
- **Like most things, there is variation – a range – to deal with.**
- **People see overgrazing from different view points; there is always room for new interpretations; like two people looking at the same painting, two different conclusions are possible.**
- **The more complex the ecosystem I think the more difficult to develop a solution to overgrazing.**

Characteristics of Overgrazed Pastures

- Grazers run out of feed before grazing season ends.
- See more ribs than rib-eyes.
- See more weeds than desirable plants.
- See more bare or open spaces grasses.
- See water ponding on soil surface.
- Gate and watering areas are trampled bare.
- Fence line is clean.
- Across the fence line is clean.
- Fence line posts leaning out (not prevailing winds!).
- You're calling around for 'cheap' hay!

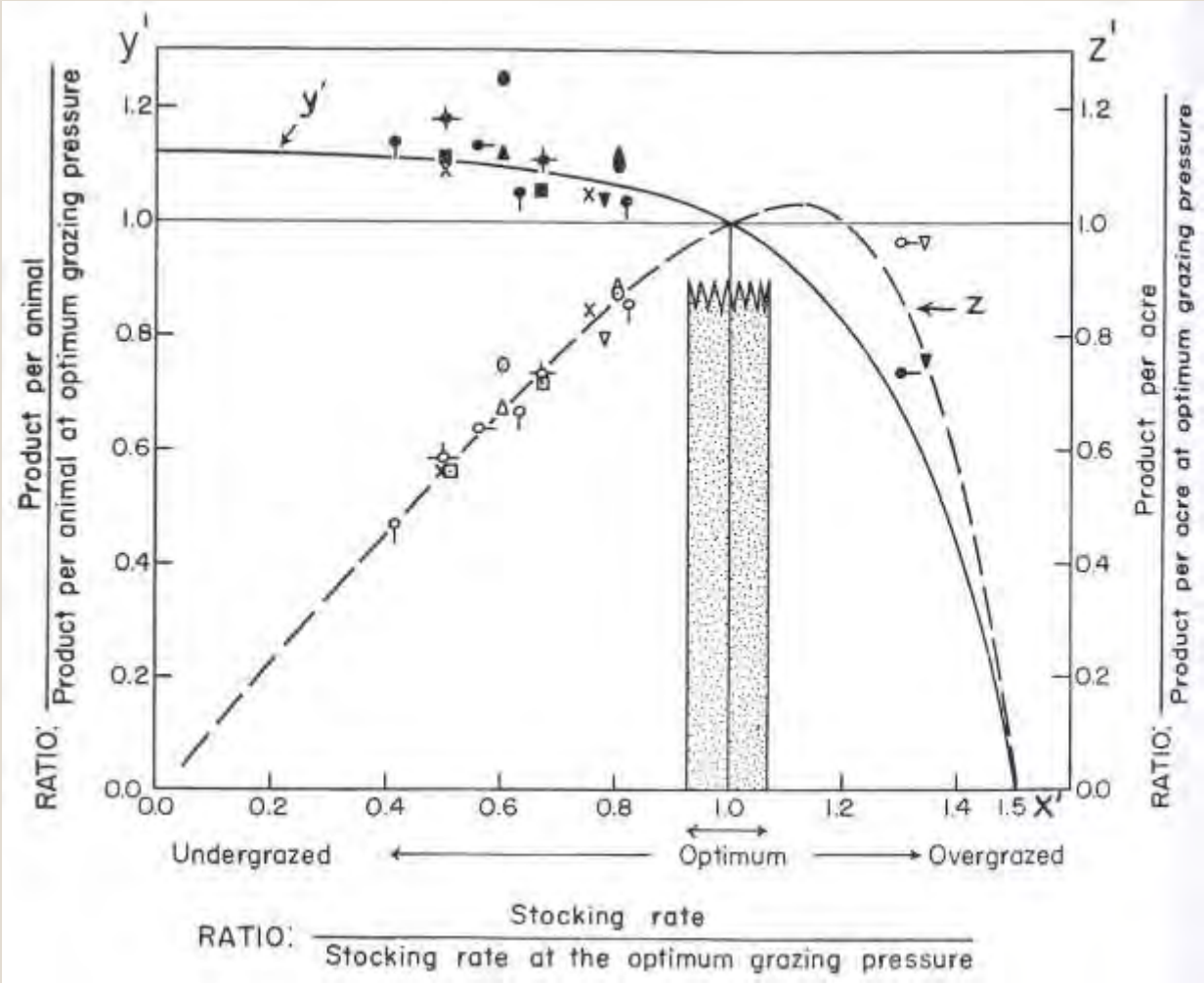
Major Pasture Growth Stages



Stage 1 = lag (slowest growth)
Stage 2 = log (fastest growth)
Stage 3 = senescence (growth largely stopped)
Stage 4 = death

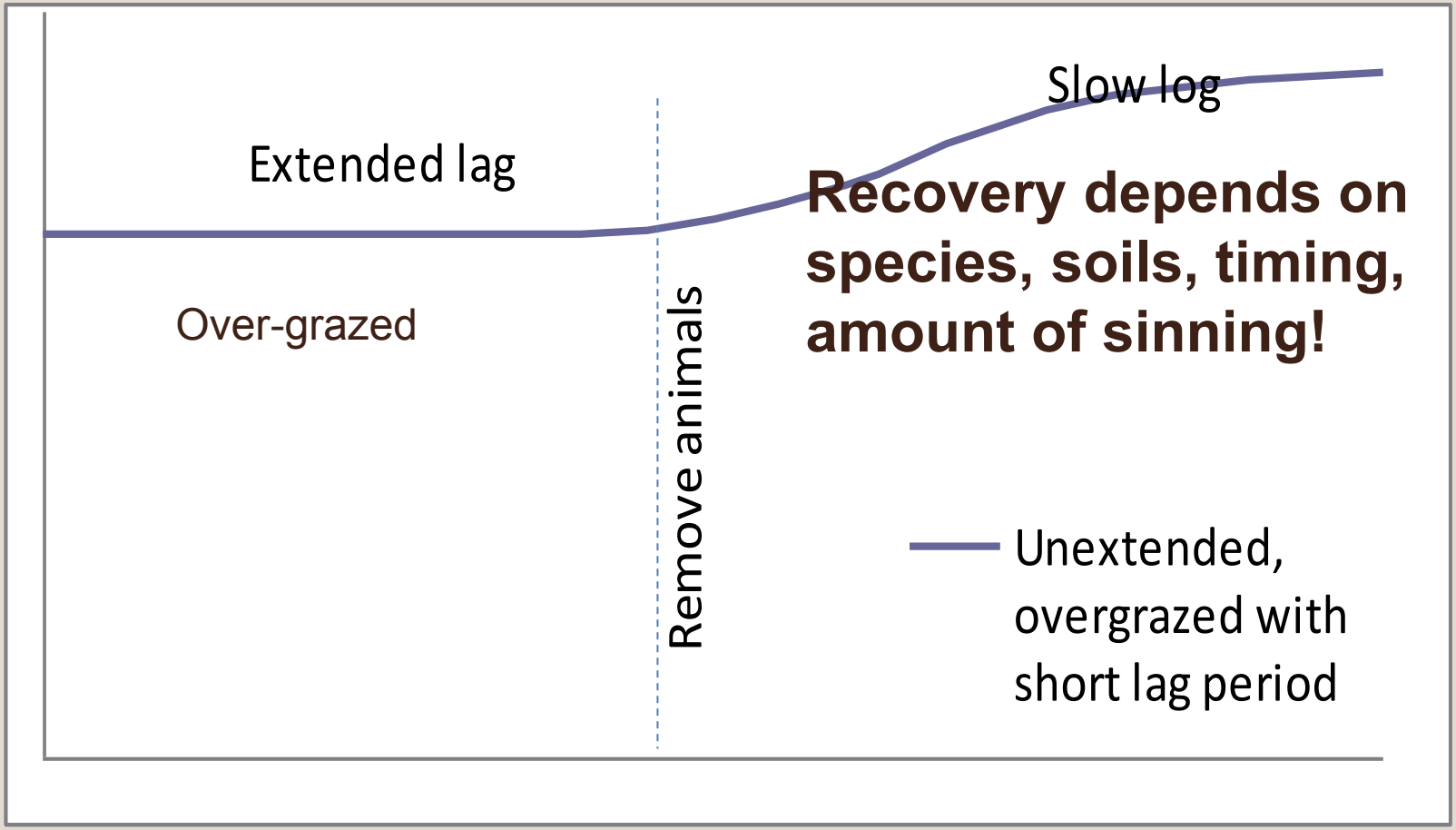
Regrown pasture – ready to graze again

Mott (1960) Curves: Overgrazing does not pay



Irrigation water alone does not make for sustainable pastures

View of Overgrazing: What really happens??



Evans (1973) PRG Roots

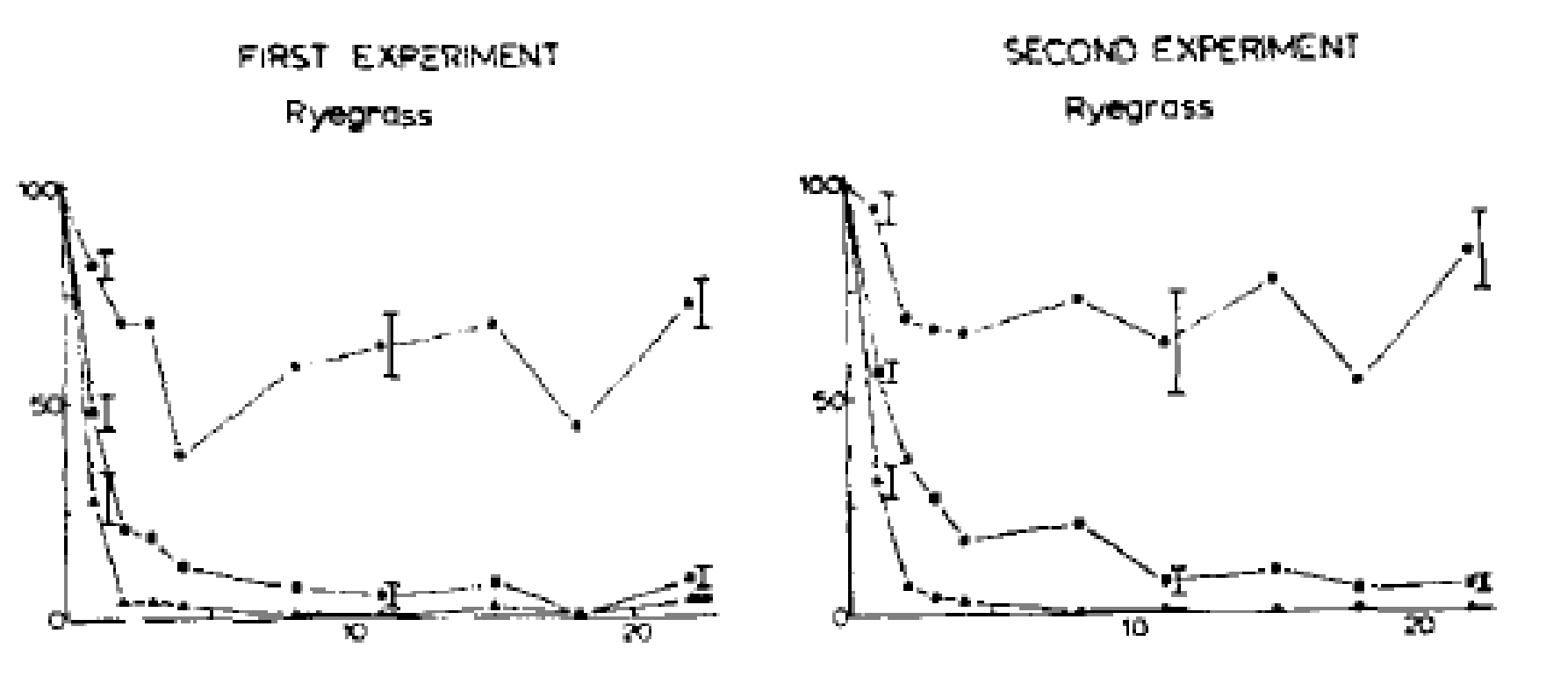


Fig. 1 - Effect of defoliation to 25 mm., 50 mm, and 100 mm every second day on root elongation. Data is % of undefoliated controls.

Evans (1973) Orchaardgrass and Timothy Roots

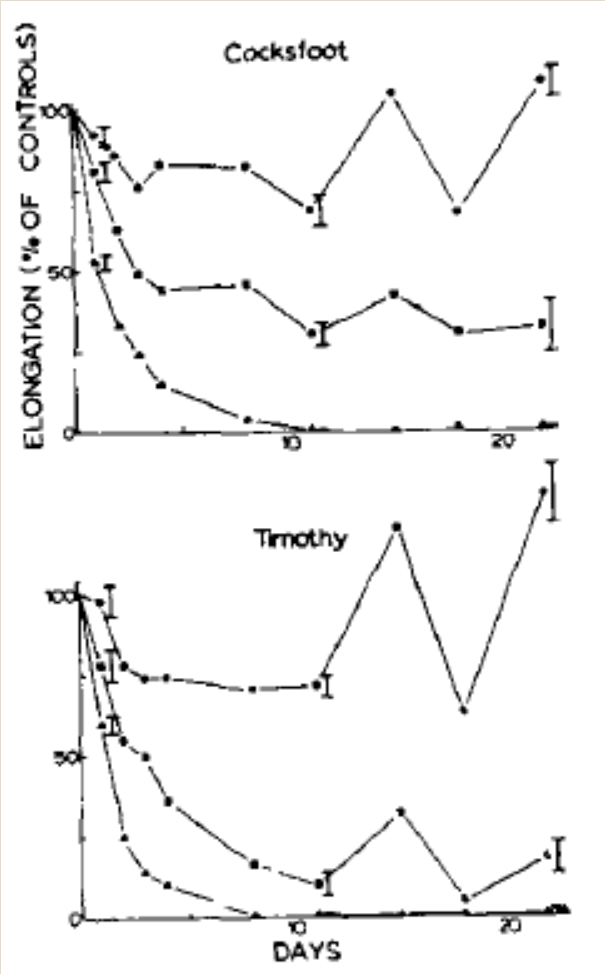


Fig. 1 - Effect of defoliation to 25 mm, 50 mm, and 100 mm every second day on root elongation. Data is % of undefoliated controls.

Evans (1973) Leaves Remaining

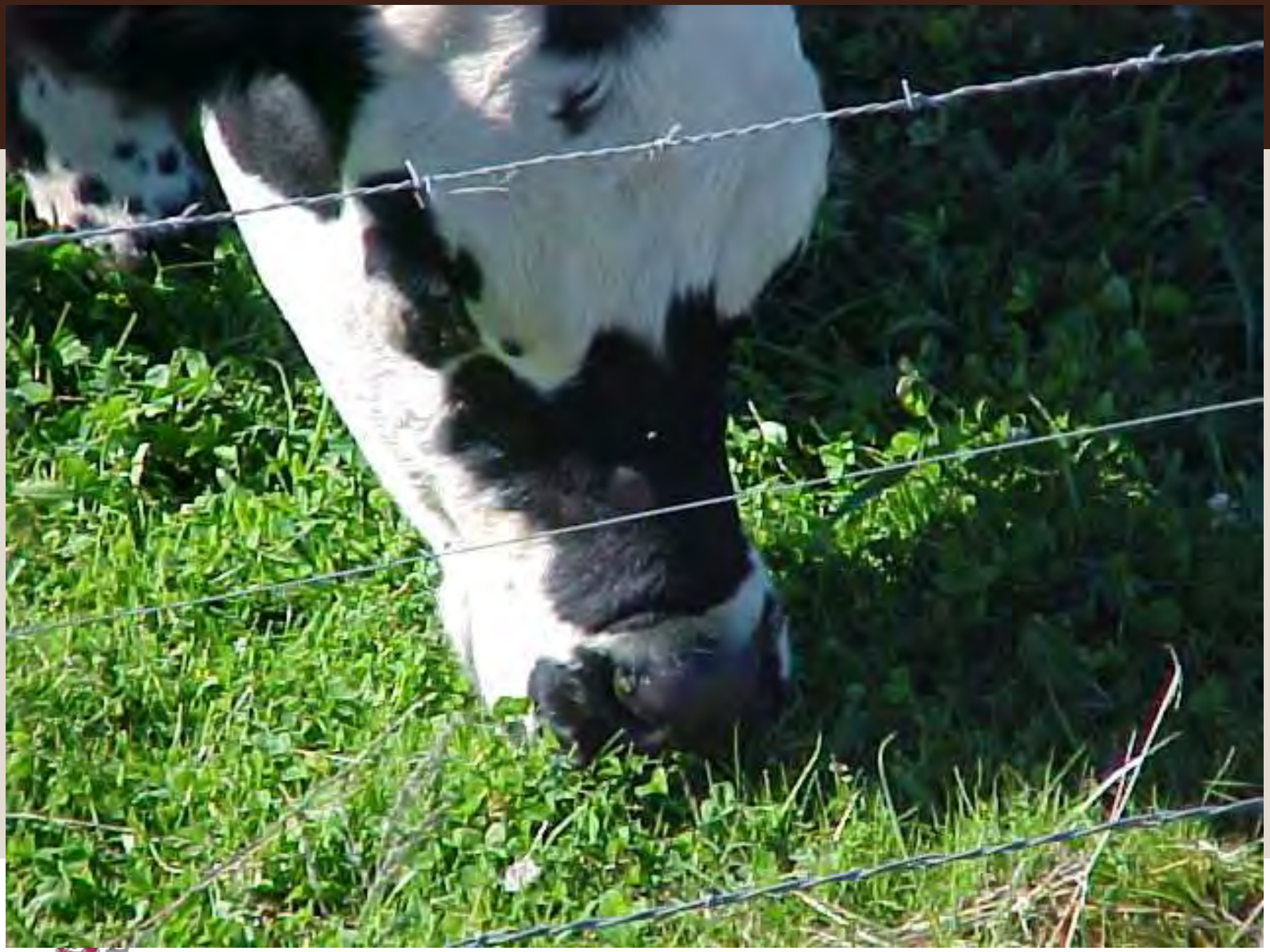
TABLE 3 — Percentages of leaf lamina remaining after successive defoliations to 100 mm, 50 mm, and 25 mm above the base of the shoot

Defoliation level	25 mm	50 mm	100 mm
Experiment 1			
Perennial ryegrass	7.5	30.7	69.7
White clover	4.2	8.8	29.2
Red clover	5.3	15.3	38.2
S.E. ±	1.08	1.82	1.94
Experiment 2			
Perennial ryegrass	2.3	13.2	54.3
Cocksfoot	11.0	32.0	69.3
Timothy	6.5	20.8	58.8
S.E. ±	1.06	2.34	3.21

Evans (1973) Root Death

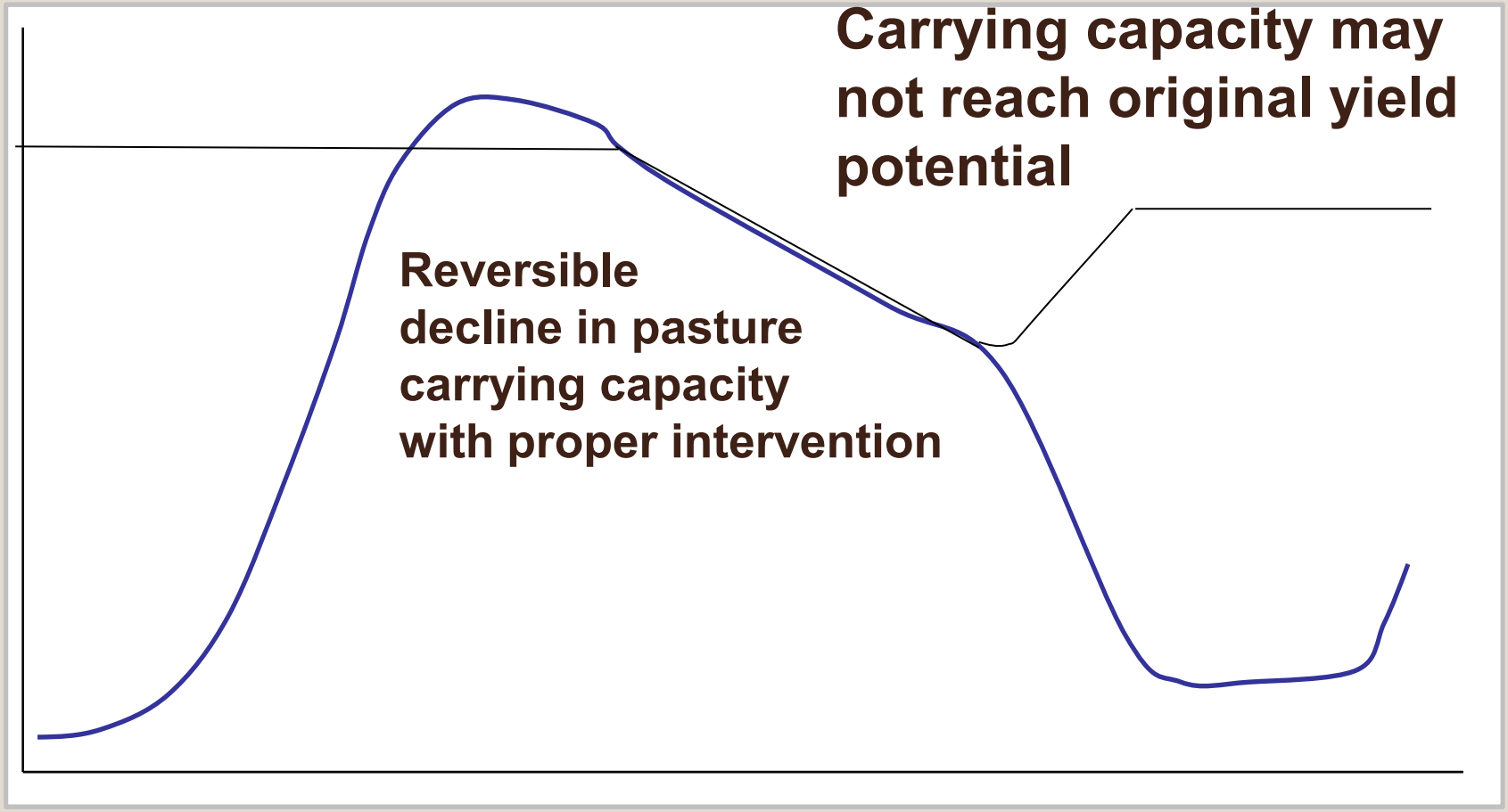
TABLE 2 — Percentage of roots measured that were dead at the end of the experiment

Defoliation level	25 mm	50 mm	100 mm
Experiment 1			
Perennial ryegrass	45.2	15.0	0
White clover	4.7	3.8	0
Red clover	2.8	4.3	1.2
S.E. ±	4.25	4.79	—
Experiment 2			
Perennial ryegrass	17.8	1.8	1.7
Cocksfoot	30.8	12.0	3.7
Timothy	9.8	1.0	0
S.E. ±	6.00	2.94	—

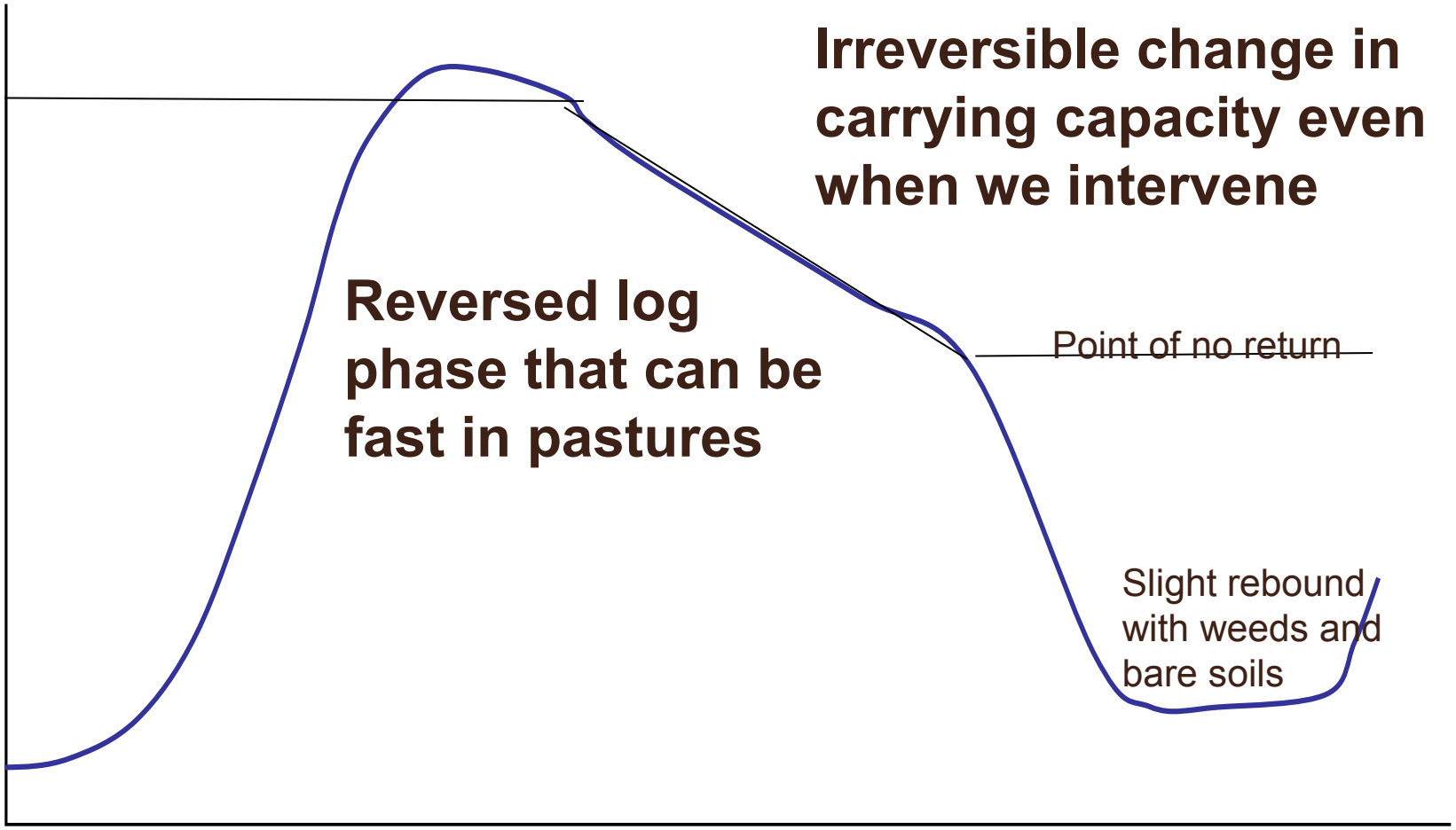


Selective Grazing does not mean Overgrazing

Potential Reversible Changes when Overgrazed



Irreversible Change when Pastures are Overgrazed



Six Weeks of Protection

Six Weeks of Protection

Five Weeks of Protection

Four Weeks of Protection

Three Weeks of Protection

Three Weeks of Protection

Two weeks of Protection

Two Weeks of Protection

One Week of Protection

Five Weeks Grazing vs Six Weeks Rest

Parsons et al (1983) PRG

TABLE 4. Intake by the sheep (kg CH_2O ha^{-1} d^{-1}) during three periods of measurement in 1979

	1979			
	1	2	3	Mean
Hard	48·6	64·9	45·5	53·0
Lenient	44·6	33·4	37·3	38·4

Parsons et al (1983) PRG

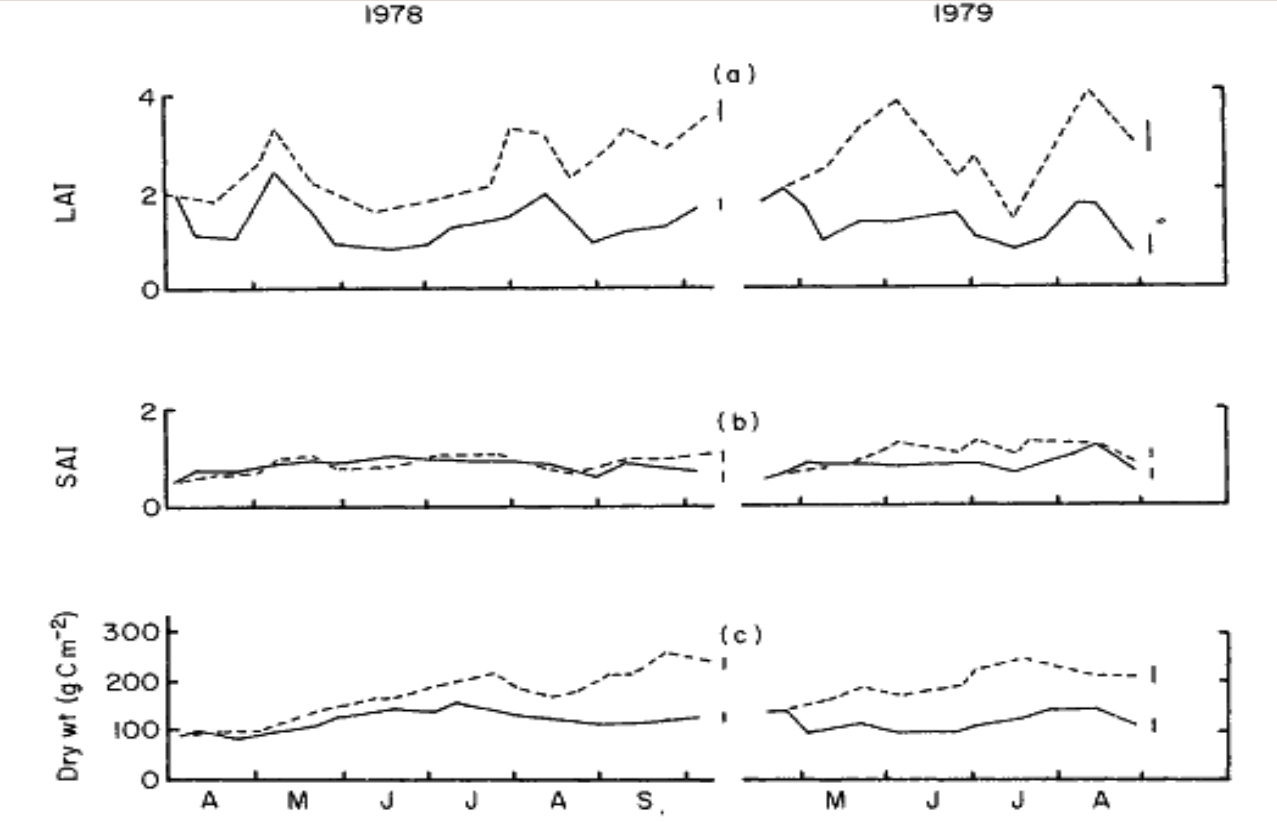


FIG. 1. (a) Leaf (lamina) area index (LAI), (b) sheath area index (SAI) and (c) sward dry weight expressed as an equivalent weight of carbon after carbon analysis in the hard (——) and lenient (– – – –) continuously-grazed swards. Vertical bars represent overall standard errors. Shaded

Pasture species after 6 years of grazing

Source: Harris and Broughan (1968)

Analyte	1 to 2 cm	2 to 3 cm
Ryegrass (%)	68	95
White Clover (%)	62	69
Bentgrass (%)	-	35
Bluegrass (%)	1	68
Oxalis (%)	-	41
Dandelion (%)	-	11
Other weeds (%)	-	67

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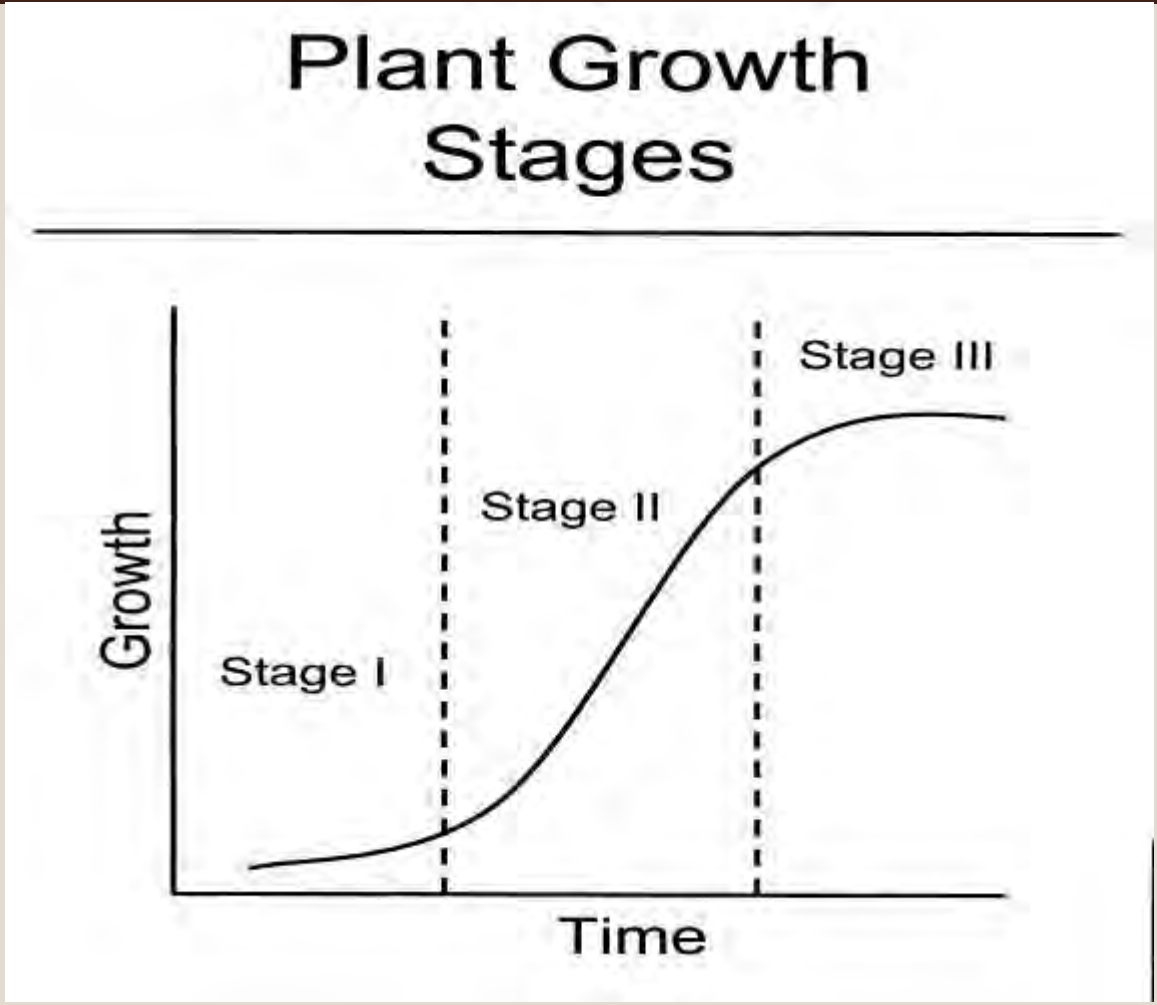

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